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ABSTRACT

The objectives of this study were to examine the need and potential demand for computer-based information services in the University of Otago medical libraries, to evaluate the various databases of interest, and to recommend the best means of access to such services. Data were collected through user and library surveys, an extensive literature search, and contacts with people experienced or involved in computer-based information services. Findings indicated a need for online services in New Zealand because of the following factors: (1) online systems are the only means available of accessing some important information, (2) information needs of health care practitioners are going unfulfilled because of their time constraints, and (3) online systems can be more cost-effective than manual searching of printed indexes. The study group therefore recommended that an experimental dial-access network be established for accessing MEDLINE in Australia. Appendices include instruments used in the surveys, pertinent data, and bibliography. (FM)

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COMPUTER - BASED INFORMATION SERVICES IN MEDICINE:

A FEASIBILITY STUDY

by

CANTERBURY MEDICAL LIBRARY

on behalf of the University of Otago Medical Libraries

IR007932

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Christchurch Clinical School of Medicine
Christchurch, New Zealand

May 1979

SUMMARY

The objectives of this feasibility study were to examine the need and potential demand for computer-based information services in the University of Otago medical libraries; to evaluate the various data-bases of interest; and to recommend the best means of access to such services. The methods used were user and library surveys, an extensive literature search, and contacts with people with experience or involved in computer-based information services.

The need for computer-based information services in New Zealand is indicated by the following factors:

a) They are the only means of accessing some important information.

b) Information needs of health care practitions are going unfulfilled because of their and their library staff's lack of time. The time-savings due to computer-based information services could remedy this situation and, therefore, be of direct benefit to patient care.

c) Computer-based information services can be more cost-effective than manual searching of equivalent printed indexes, and inevitably will be in the future.

Batch-operated computer-based information services are inadequate as a substitute for online services. Overseas statistics and the user survey indicate that the University of Otago medical libraries might expect to perform about 1000 MEDLINE searches in the second year of MEDLINE availability. In about the third year the national rate of MEDLINE searching might be about 2000 per annum. MEDLINE is the most popular health sciences data-base and would still account for about half of the medical libraries' searching, even when other data-bases are readily accessible.

At the rate of 2000 searches per annum, the most cost-effective means of access to MEDLINE would be by dial-up access to the Australian MEDLINE network. This would cost about $17 - 18 per search, excluding staff time. Cheap-rate, international data communications to America, if introduced, would make online searching of a wide range of American data-bases an economical proposition.

It is recommended that an experimental dial-up network should be established for accessing MEDLINE in Australia Apart from terminals and telecommunications facilities, the libraries involved will need trained staff, and the literature resources necessary to back-up the service. Cooperation at a national level will be needed to implement and operate successfully the experimental MEDLINE network.

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GLOSSARY

Accoustic coupler	A device which links a computer terminal to a telephone. It converts the computer's electronic pulses into a signal which can be picked up by the telephone receiver and transmitted over telephone wires.
AUSINET	An online computer-based information service network, incorporating NLA and CSIRO data-bases, and ACI telecommunications and computer facilities.
Batch	A mode of computer operation in which jobs are run in batches, and the operator cannot communicate with the computer while a job is running.
BLAISE	British Library Automated Information Service; an online CBIS network which offers MEDLINE, TOXLINE, MARC.
CBIS	Computer-based information service.
DATEL	Telephone wires of especially high quality used for international data communications via dial access.
EURONET	A European public time-sharing data communications network. Can be used to access a number of CBIS including BLAISE.
MIDAS	Multi-mode International Data Acquisition Service: a data transmission service between Australia and the U.S.A.
Modem	Modulator/demodulator: converts the computer's constant-level, direct current pulses into signals suitable for transmission via telecommunications facilities. Used as a permanent wired-in link between a terminal and a telephone.
Online	A mode of computer operation in which the operator can communicate directly and immediately with the computer, via a terminal, and can therefore interact with the program.
SDI	Selective dissemination of information: a personalised current awareness service.
TELENET) TYMNET)	U.S. public, data communications and computer time-sharing networks, which give access to NLM, SDC and Lockheed's online information services.

CHAPTER 1

INTRODUCTION

Computer-based information services and in particular online literature searching are now firmly established in libraries in North America, Europe and Australia, not to mention some less developed countries. They are bringing about changes in library services as significant as those introduced by photocopiers some years earlier. Nevertheless, the feasibility of bringing the online revolution to New Zealand has been seriously questioned. It has been argued that for such a small, geographically isolated country, computer-based information services would not be cost-effective.

The need for a study of the feasibility of accessing computer-based information services was recognised by the librarians of the three University of Otago Medical Libraries (Canterbury Medical Library; University of Otago Medical Library, Dunedin; and Wellington Medical Library). Medicine has been one of the leading subject fields in exploiting online services overseas, mainly because of the pioneering efforts of the U.S. National Library of Medicine. If computer-based information services have any chance at all of succeeding in New Zealand, then they should succeed in the medical and allied health field.

A proposal for a feasibility study was submitted to the Trustees of the National Library of New Zealand and subsequently a research grant was awarded to the Canterbury Medical Library to carry out the study with the help of the other libraries. The terms of reference were:

a) to identify the information requirements of the users of the three medical libraries for access, including online, to computer -based information services;
b) to identify, cost and evaluate the various data-bases needed to meet these requirements;
c) to cost and recommend the means, i.e. the equipment and facilities, whereby these needs can be met.

The study, carried out between June 1978 and April 1979, was restricted to the University of Otago for reasons of time and finance. It was felt, however, because the three medical libraries formed a microcosm of national needs, that the results would be of national significance.

The terms of reference were formulated before the Working Group on Computer-Based Information Services was set up by the Information Services Committee of the Trustees of the National Library. One of the Working Group's terms of reference is: "To investigate and recommend appropriate methods of organisation of computer-based information services." Therefore this study has been confined mainly to problems specific to the medical field. The more general problems have been left to the Working Group to investigate.

The body of this report covers the need for, and advantages of computer-based information services; the potential user demand; an evaluation of the data-bases of medical significance; the facilities, in terms of telecommunications, equipment, staff and backup services, required for such services; and recommendations for future action. It is recommended that anyone not familiar with computer-based information services should read the 'layman's outline' included in a letter and questionnaire sent to a sample of potential users, and reproduced in Appendix 1A.

CHAPTER 2

METHODS AND MATERIALS

2.1 SURVEYS

2.1.1 USER SURVEY

A survey of the information sources and search methods of the users of the three medical libraries of the University of Otago (in Christchurch, Dunedin and Wellington) was carried out in order to establish the potential use of computer-based information services (CBIS).

Market assessment surveys of this sort have obvious weaknesses which could give misleading results because:

a) only a small number of potential users are familiar with CBIS;

b) the precise nature of the information services and the associated charges are not defined.

In order to alleviate these problems a detailed description of CBIS was sent out with the questionnaire. This covered the types of services offered and indicated current overseas price ranges. The questionnaire then tried to elicit potential use at different price levels. The reliability of the survey results is discussed in Chapter 4, but overall it is considered that the survey provides useful information, especially if the results are examined in relation to overseas statistics.

A pilot questionnaire was prepared in May 1978 and displayed in the three libraries along with an outline description of CBIS. Library users were encouraged to fill in the questionnaire. The answers to this pilot questionnaire were then used as a guide in refining and clarifying the final version.

The revised questionnaire went to a randomly selected sample of potential users. The library registration files were used as a sampling frame, but the following user categories were excluded from the survey:

1st - 3rd year medical students
Non-medical university students
Paramedical students

These groups were considered unlikely to be potential users and they are unevenly represented at the three locations. (See Appendix 2, Table 1) Therefore, they were excluded in order to reduce the number of questionnaires required and to make the results from the three centres more uniform.

The sampling method was to select every eighth card from the registration file, but then to ignore those selected which fell into the above user categories. The result was the following sample sizes in terms of the percentage of potential users.

Christchurch	10.39%
Dunedin	12.46%
Wellington	9.89%
Overall	11.01%

The questionnaire and the accompanying letter and description of CBIS (Appendix 1A) were distributed between 24th and 27th October, 1978. A list of recipients was kept and replies or negative answers (such as a return indicating that the recipient had moved away) were checked off against this list. Reminder notices were sent to those who had not replied in mid-November. All questionnaires received at Canterbury Medical Library by 19th December 1978 were accepted. Appendix 2, Table 2 gives an analysis of the response. The data were entered on to the Christchurch Clinical School PDP 11/70 mini-computer and programs supplied by CCS biostatisticians were used for data analysis.

2.1.2 SURVEY OF UNIVERSITY OF OTAGO LIBRARIES

A questionnaire on the use of CBIS was sent to the three medical libraries and the central library of the University of Otago (Appendix 1 B). The objective was to establish the extent to which these libraries had been using CBIS and to obtain their evaluation of the services provided, with special reference to MEDLARS. Questions were also included on library back-up services and sources of finance for CBIS. This questionnaire was distributed in August 1978.

2.2 LITERATURE SEARCH

An extensive literature search was carried out looking into the following areas:

Computer-based information services

- statistics on use overseas
- evaluation
- costing

Specific medical and related data-bases

- scope and availability
- evaluations

Equipment and facilities

- telecommunications
- computer and terminal equipment

Impact of CBIS on library services

- policy
- intermediary or user searching
- user education
- backup services.

The following abstracting and indexing journals were referred to:

Library Literature
Library and Information Science Abstracts
Index Medicus

Overseas contacts were found useful for more up-to-date references. The bibliography at the end of this report includes the more useful articles found, as well as those referred to in the report.

2.3 PERSONAL CONTACTS

Personal contacts in New Zealand and overseas were used to fill gaps in required information not supplied by the surveys and literature search, and for advice on specific arrangements for New Zealand to access CBIS. The people or groups contacted and subjects discussed are listed below.

Miss M. Ronnie, N.Z. National Librarian - MEDLINE links to Australia
Dr. G. Chandler and others, National Library of Australia - MEDLINE links to Australia, MEDLARS and MEDLINE use
Dr. M.M. Cummings, U.S. National Library of Medicine - New Zealand access to MEDLINE
Miss. E.M. Robinson, Ernest & Marion Davis Library, Auckland Hospital - BLAISE training, New Zealand access to MEDLINE
Mr. H.D. Erlam, Philson Library, and other Auckland University library staff - accessing Australian MEDLINE service
Mr. G. Johnstone, Wellington Medical Library - working experience with MEDLINE in Canada.
Ms. B. Thompson and others, Dept. of Health Library - MEDLINE use.
Mr. D.G. Jamieson, Medical & Dental Librarian, University of Otago - accessing Australian MEDLINE service.
Mrs. B. Bird, University of Hawaii - MEDLINE experience in Hawaii.
Miss. F.M. Picken, St. George's Hospital Library, London - BLAISE experience.
Mrs. R. Smith, UEB Auckland - experience with online use of CBIS from New Zealand.
ADIS (Australasian Drug Information Services) staff, Auckland - AUSINET, possible creation of New Zealand drug information data-base.
ACI (Australian Consolidated Industries) and AHI (Alex Harvey Industries) representatives - extension of AUSINET to New Zealand
Mr. T. Hanley and Miss. E. Flavel, Wellington Polytechnic - PEACESAT.
Dr. H.J.H. Hiddlestone, Director General of Health, and Mr. E. Cox and others, EDP Dept. of Health - Dept. of Health computer network.

Mr. J. Flavell and Mr. M. Ball, Computer Services Division, State Services Commission - telecommunications facilities for accessing CBIS.
Mr. M. Saunders, Telegraph & Data Section, N.Z. Post Office - telecommunications facilities for accessing CBIS.
CBIS Working Group - access to CBIS.
Various medical Library users in Auckland, Christchurch, Dunedin, Invercargill and Wellington - opinions on potential use of CBIS.

CHAPTER 3

THE NEED FOR COMPUTER-BASED INFORMATION SERVICES

3.1 INTRODUCTION

Computer-based information services have been available for a number of years in North America and Europe and there is now plenty of statistical evidence to show their increasing popularity and large potential market. Williams (147) reports that there were one million online searches done in North America in 1975, two million in 1977, and that use is continuing to grow rapidly.

Similarly, one would expect a potentially high demand for CBIS in New Zealand. Proving the need for these services is rather more difficult. Some would also suggest that it it is unnecessary - that the fact that users are willing to pay for the services in itself proves the need. However, in the health care field it is usually the Government that foots the bill, and while individual users may be happy to spend government money on CBIS, such expenditure should really be considered in terms of national priorities for health care. The feeling already exists in New Zealand that the health services, along with those in other "advanced" countries, are becoming too technology oriented, so it is important to establish that CBIS are not just another expensive toy, or a passing fad. New Zealand is a small country in a unique situation and its isolation could increase or reduce the potential value of CBIS in comparison with America or Europe. Therefore, it is important to establish whether there is a real need for CBIS in New Zealand.

The remainder of this chapter discusses this question. The arguments fall into two categories: first, that CBIS can provide access to information which would otherwise be unavailable; second, that even where alternative "manual" access methods exist, computerized searching has many advantages over manual methods and can be more cost-effective. Finally, the relative merits of online and batch computer searching are discussed.

3.2 NON-PRINT DATA-BASES AND DATA BANKS

CBIS were originally viewed by librarians as an alternative to conventional searches of printed indexes and catalogues. However, an increasing number of data-bases are appearing for which no printed version is available - the information they contain can only be extracted by computer search. This type of "magnetic publication" has obvious advantages for rapidly changing subject fields, because editing and updating are much simpler, quicker and cheaper than for printed publications.

This is particularly true for data-bases containing numerical data rather than bibliographical data, the so-called "data banks". Compilation and condensation of evaluated data into data-banks, which are continuously maintained and updated, is an ideal way of short-circuiting the conventional, time-consuming procedure of publishing original articles, reviews and data compendia, and thus is a way of coping with the information explosion. For these reasons it is likely that magnetic publication will continue to grow at the expense of print publication. Williams (146) writes that "electronic access to online journals, data banks, and abstracting and indexing sources will be provided by online vendors, and the publishers themselves may change roles and function as service vendors. Both technological and economic motivations are present - it is only a matter of time."

It is estimated that several humdred data banks are publicly available and that European online searches of data banks amounted to over two million in 1976, which was ten times greater than searches of bibliographic data-bases (136). This is despite the fact that few of the data banks are widely available, for example nearly all the data-bases offered by the major U.S. vendors of CBIS are still bibliographical data-bases. It is predicted that this will be the major expansion area for online services.

Medicine is one of the leading subject fields in terms of availability of data-bases, data banks and exploitation of magnetic publication. The U.S. National Library of Medicine has supported pioneering research and development in this area and now offers online access to a number of non-print data-bases and data banks as part of its computer-based information service. One example is the CANCERPROJ data-base, which contains descriptions of on-going cancer research projects and clinical trials. This data-base will be continuously weeded and updated with new project information. In the data bank category NLM offers CHEMLINE, Toxicology Data Bank, RTECS (Registry of Toxic Effects of Chemical Substances), and the Laboratory Animal Data Bank will soon be available through the online network. Descriptions of these data banks are given in Chapter 5.

With the encouragement of the medical profession, NLM is continuing research and development work into information systems providing for the daily needs of health practitioners (98). A small number of comprehensive knowledge banks is being constructed by analysis, synthesis and translation of clinically relevant information from books and journals into compact, manageable computerized forms (99). A prototype Hepatitis Data Base has been completed which contains substantive answers to questions posed by practitioners, based on a consensus of expert opinion and supported by data and bibliographic references. The data-base will be maintained current by review of selected literature by experts.

All these developments indicate a growing body of important information which will only be accessible through computerized searching. In medicine the databases and data banks are being developed by NLM as an integrated system. Thus if the New Zealand medical profession is to have access to this information, it is essential that the medical libraries gain access to computer-based information services.

3.3 COMPARISON OF MANUAL AND COMPUTERIZED SEARCHING

3.3.1 PERFORMANCE COMPARISONS

For the majority of computerized bibliographical data-bases printed versions do still exist and the choice between manual and computerized searching has to be made on the basis of their relative performance and cost-effectiveness. Many of the earlier comparisons considered only the relative performance of the different systems, based on the recall and precision values of the search results. (2, 68, 70, 137) Use of the recall and precision criteria is based on the assumption that all users ideally prefer 100% recall and 100% precision. In fact, it is now generally realised that users have varying requirements (14), for example, Lancaster (70) and Foreman (38) report that 50% and 73% respectively of their MEDLINE user samples desire "only a few relevant references". This idea is also supported by investigations of the proportion of retrieved relevant references actually read by users, which Vickery found to be 13 out of 18 new, relevant references, on average. (136) Barraclough also points out that online users often tend to cut off the search before all the references have been printed (9). Nevertheless, comparisons of performance in terms of recall and precision are valid so long as the broader perpective is not forgotten.

It was predicted that computerized searches should give better results than manual ones, because:

a) more complex searches combining any number of search terms, in any logical combination, are possible, thus facilitating a high precision;

b) more exhaustive searches are generally possible because of more detailed indexing of the computer-based version (e.g. an average of 12 index terms per reference in MEDLARS, versus three subject headings on average in Index Medicus), and the availability of extra elements, such as words in titles and abstracts, for searching. These features should facilitate higher recall.

In actual comparative studies the results have been somewhat inconclusive. In fact, CBIS sometimes produce a high proportion of irrelevant references unless the printout is manually screened. The only general conclusions that can be made are that neither method will give 100% recall and 100% precision, and that for any search there may be surprisingly little overlap between the two sets of references produced by manual and computer searching. (2).

Vickery (136) reports one study where only 10% of the total relevant references were retrieved by both systems, and Virgo reports a 35% overlap. (137) Clearly, if a user really does want 100% recall, he will have to use both methods. In addition, differences in performance due to the method of access (manual or computerized) may be less significant than differences due to the experience and the strategy of the searcher, or than differences between data-bases due to their different indexing and searching techniques. (8, 51, 136)

3.3.2 TIME AND OTHER FACTORS

Despite the above results, users in real-life situations have often indicated a preference for computerized searches, and overall satisfaction with the results. In a large-scale survey of online system users carried out by Systems Development Corporation (SDC) in 1975 it was established that 63% of information service managers believed their users preferred online to manual searches, and 75% of the managers felt that online searches were more cost-effective. (139) Moll reported that 93.5% of the recipients of a free MEDLINE service said it was better than manual searching. (93) Obviously performance in terms of recall and precision is not of paramount importance to information service users, and other factors affect the choice of search mode. The factors in favour of computerized searching are listed below.

a) It takes less user time and effort.
b) A printed bibliography is produced.
c) The computer files are more up-to-date than the printed equivalent, especially in New Zealand where printed indexes may be delayed in the mail.

Of these factors, the saving in time and effort is by far the most important to the user, and to the library offering an information service. Computerized searches virtually always take less time than equivalent manual searches. (136)

The potential time savings from CBIS are especially important in New Zealand for both library staff and users. With the current shortage of well trained, experienced reference librarians and problems of staff ceilings in public service libraries, it is essential that libraries make the best use of their staff. CBIS are one way of increasing staff productivity. Overseas surveys have shown that CBIS have enabled many libraries to offer a literature searching service for the first time, and other libraries have been able to offer improved service, with the total number of searches nearly always increasing when CBIS are introduced. (139) New Zealand medical libraries have insufficient staff to satisfy the literature searching needs of all their users, and hence have had to rely on the users to do most of their own reference work. The survey of the University of Otago medical library users showed that 96% of the respondents had done literature searches in the previous 12 months, whereas only 34% had had searches done for them by library staff.

CBIS would enable the libraries to offer better service and would facilitate the introduction of such patient-care-oriented programmes as clinical medical librarianship, which would otherwise be virtually impossible. In terms of the national economy it is obviously more economical for literature searching to be done by librarians rather than by more highly paid medical staff.

The user survey also showed that lack of time is the major factor discouraging the users of the three medical libraries from looking in published literature for required information. In response to the question:

"When you need information which you would expect to be available in published literature, including books and journals, do you try to obtain the information from the literature?"

- only 42% answered "always". When asked for the reasons for not referring to the literature, only 27% cited alternative, more readily available information services, so presumably the remaining 31% simply went without some required information. The most frequently cited reason (by 33% of the sample) for not referring to the literature was lack of time. In addition, time appeared to be a greater problem for those mainly involved in patient care, and for students, than it was for people mainly involved in teaching and research. (see Appendix 3, Table 2.2.1 for details). Thus we know that many staff involved in patient care are unable to fulfill their information needs through lack of time. Online services therefore have a great potential for contributing directly to health care in New Zealand.

As well as the time savings, CBIS offer libraries the additional advantages of resource expansion and portability. Fringe interests can be catered for because with one terminal the library can access many data-bases whose print versions could not be afforded. It may even be possible for the library to save money by cancelling subscriptions to abstracting and indexing services in subjects of peripheral interest. For example, the University of California, San Diego, Biomedical Library has cancelled all its subscriptions to Excerpta Medica and now relies on online access. Portable terminals can also save on duplicate subscriptions to abstracting and indexing journals at a number of locations.

CBIS do have some associated problems for libraries. Apart from direct costs, the main problems are:

a) specially trained staff are required;
b) special equipment is required;
c) many of the data-bases have only three to five year backfiles on computer.

To enlarge, although special staff training is required, most libraries using CBIS on a small scale, train already existing staff. The SDC survey showed that 65% of the user libraries found it was not necessary to employ extra trained staff. (139)

The equipment may require a high initial outlay or monthly rental but, again, existing computer terminals in the organisation, or being used within the library for other automated systems, may be available. In any case, equipment prices are falling and a simple terminal can now be bought for under $2,000, which is comparable to the annual subscription cost of some abstracting and indexing journals.

Short backfiles are less of a problem in medicine than in other subjects because the relevant data-bases have been in existence much longer. The MEDLARS files cover from 1966 on, and although only the last two or three years are available for online searching, the search profile used for the online search can be saved and used off-line to search the back files. In addition, medicine is such a rapidly changing subject that the older literature is less important.

3.3.3 COST-EFFECTIVENESS

Thorough cost-effectiveness comparisons of manual versus computerized literature searching are few and far between, and non-existent in the medical field. Vickery reviews a few comparisons, (136) and two others have been published by Buckley, and Smith. (20, 118) According to Vickery: "a few conclusions stand out:

(1) the actual personal time involved in search will in all cases be longer for manual than for computer search,
(2) though it is not easy to assess the true costs of manual search, the evidence suggests that they can be greater than for computer search,
(3) neither mode of search is to be uniquely preferred over the other - experience will indicate which is best suited for particular types of search topic, and
(4) in many cases the two modes should be seen as complementary - the ideal search pattern is to combine the two methods."

To these can be added the comment that if it is a scientist, doctor or academic doing the manual search rather than a librarian, it will be relatively even more expensive. Also, only two of the studies referred to took any account of savings made by cancellation of abstracting and indexing services.

Would these conclusions hold for New Zealand? The main part of the cost per search is in computer time, telecommunications and printout costs. In New Zealand telecommunications costs to access overseas data-bases could be relatively higher than in America or Europe. But even here the advent of cheap time-sharing telecommunications networks is probably not far off and should bring charges at least into line with European rates. The "MIDAS" link has just opened up cheap telecommunications access between Australia and the U.S.A. at A$10-12 per hour, plus a per character charge. (91)

3.4 ONLINE VS BATCH

CBIS in batch mode are already available to New Zealanders from Australia, America and Britain. However, the overseas services have not been heavily used, and their use seems to be declining. Appendix 4 shows New Zealand use of MEDLARS services from the Australian National Library. The fall in the number of searches may be partly because some libraries are tending towards requesting online searches to be performed for them in Britain or Hawaii, rather than using ANSTEL's batch service. Jones reports that the number of SDI profiles on Biosis Previews has fallen from 84 in 1975 to 36 in 1977, mainly as a result of the introduction of charges. (62) Overseas studies also show a decline in batch searching after the introduction of online services, except as an adjunct to online searches, for example, an off-line search of back files using a profile created online. Online search statistics are always far higher than previous batch searches on the same data-base.

The reasons for the relative unpopularity of batch computer searches in comparison with online are given below.

a) The time lag before batch results are received is much longer. The survey of the University of Otago libraries showed that the average time taken for MEDLARS results to arrive from ANSTEL is one to two months, making them almost useless for patient-care-related questions. Online results would be available immediately (if printed online) or at least within a few days.

b) Batch processing does not allow any interaction between the searcher and the data-base. In online searching the searcher can browse through retrieved references on the terminal and modify the search strategy on the basis of the feedback, in order to improve the recall and precision, and retrieve a suitable number of references. Without this flexibility batch searches cannot be tailored to the users needs and, therefore, usually work on the assumption that a high recall is required, and consequently often overload the user with irrelevant references. In order to achieve satisfactory results, up to half the profiles may have to be run more than once and modified. (63)

c) The search has to be delegated to a trained searcher, who is often not in direct communication with the user, so misinterpretations can affect search results. With online searching the user may have the option of doing his own search, or observing.

d) The range of data-bases available is not as great as from online CBIS.

e) Batch searching is no longer cost-effective for retrospective searches, in comparison with online. For example, a search of the NTIS data-base which costs $15 online, may cost $50 from a batch CBIS. Batch searching may still be cost-effective for SDI searches, especially if the system was designed for that purpose, and where the user market is great enough to make the service economic.

Thus it appears that the costs of computerized and manual searching are, or very soon will be comparable. CBIS have the long-term advantage that many of their cost components are falling whereas the cost of manual labour is increasing. Computer processing and storage, and telecommunications costs are all falling (though telecommunications charges to users do not necessarily follow the cost trends). In 1974 McCarn analysed the trends in computer and telecommunications costs, which are falling, and staff and publication costs, which are increasing exponentially. (78) He predicted that by 1979, for a rate of one search per hour, it would be cheaper in America to use online MEDLINE searching rather than to buy and use Index Medicus. These trends in costs are almost certain to continue, and will make CBIS relatively more cost-effective than manual searching. Data-base charges are unlikely to fall, because they will have to assume a larger proportion of the creation costs, which at present largely fall on the printed versions. More details of costs of different means of access to CBIS are given in Chapter 6.

3.3.4 MAKING THE CHOICE

For the individual user or library the choice between CBIS and manual searching will depend on which is the most cost-effective at the time and for the particular search required. Assuming that the library has made the decision to make CBIS available, the choice for any one search would mainly depend on the expected time required to do the search manually. Some searches can be done just as quickly on a printed index, for example a straightforward author search in cumulative Index Medicus, and, according to Collier, it is quicker to do a citation search on the printed Science Citation Index than online. (26) In general, the more complex the subject of the search, and the more exhaustive the search required, then the likelier it is that a computerized search will be more cost-effective. Similarly, if the terms describing the subject are not directly equivalent to index terms in the printed index, then a computerized search may be quicker if techniques are available for searching for words in titles or abstracts. The criteria for choice will differ slightly for each index or data-base and each CBIS system according to their effectiveness. MEDLINE has a very powerful "explode" technique which enables a search on all the terms in a particular hierarchy (eg. all pesticides), which would be impractical to perform manually. Finally, the number of separate issues of the index to be examined obviously affects the time required: for Index Medicus there may be 18 monthly issues as well as annual cumulations.

The actual proportion of searches in a New Zealand medical library which might be done online is impossible to say at this time. However, the SDC user survey showed that in 1975 12% of the centres surveyed were doing all their literature searching wholly online; 55% were doing over half their searches wholly online; and 16% were doing over half their searches partly online. Those libraries with the longest experience of online searching tended to do a greater proportion of their searches online. (139)

> Vickery makes some comparisons of different modes of SDI (online, storesearch, automatic SDI, in-house batch processing, and batch SDI from commercial vendors). (136) It is notable that at batch processing centres, personnel costs range from 61% to 84% of total costs (63, 74), compared with approximately 10% for online searching. (55) This may be some indication of the inefficiency of profile formulation on batch systems, and also of the amount of time required for softwave development and maintenance.

Thus it can be seen that the availability of batch CBIS is no substitute for online services.

3.5 CONCLUSIONS

The need for CBIS in New Zealand is indicated by the following factors.

a) It is the only way of accessing some important information.

b) Information needs of New Zealand health care practitioners are going unfulfilled because of their and their library staff's lack of time. The time savings due to CBIS could remedy this situation and, therefore, be of direct benefit to patient care.

c) CBIS can be more cost-effective than manual searching, and inevitably will be in the future.

d) Batch CBIS are inadequate as a substitute for online services.

CHAPTER 4

POTENTIAL USE OF COMPUTER - BASED INFORMATION SERVICES

4.1 INTRODUCTION

Having established the need for computer-based information services in New Zealand, we will now try to predict the level of demand. This is a necessary step because the most economical means of access is largely dependent on the level of use. This chapter is mainly concerned with online searching, though current awareness services, which could be either online or batch, will be considered. It is assumed that once online access is available, batch retrospective searching will continue at the same level or decline, except as an adjunct to online searching.

Two methods have been used in predicting demand for CBIS:

a) statistics on overseas use, and

b) surveys of the University of Otago Medical Libraries and their users to estimate present and potential demand for CBIS.

4.2 OVERSEAS EXPERIENCE

Statistics of overseas use of CBIS, and in particular MEDLINE, have been collected both at the national and the institutional level.

4.2.1 NATIONAL LEVEL STATISTICS

In order to predict demand levels for CBIS at any point in time, it is necessary to understand the growth patterns of such services. Figure 4.1 shows that the growth curve for online searches in the U.S. is following the typical pattern for the spread of any innovation. Growth starts off slowly, then gradually accelerates to a rapid level. the U.S. is currently at that point on the curve, with an annual growth rate of over 40%. The curve usually then begins to level off as market saturation is approached. Figure 4.2 indicates that the MEDLINE growth curve may be beginning to level off. In fact, usage in connect hours in U.S. medical schools has reached saturation level and zero growth after five to six years of use, (at an average of 245 connect hours per annum) but hospital and industry usage are still growing at 25% and 50% per year respectively. (79) The saturation level depends only on the size of the potential user population.

The same type of growth curve can be expected in New Zealand, and thus the level of use will depend on the length of time CBIS have been available and on the total size of the market - the potential user population. In Table 4.1 statistics for online searches in a number of countries are arranged in order of the length of time online CBIS have been available in those countries. Searches are then related to the country's population. It can be seen that in the U.S. in 1977 the number of online searches was approaching 1% of the population. The last column gives the number of searches predicted for New Zealand at the same percentage population level.

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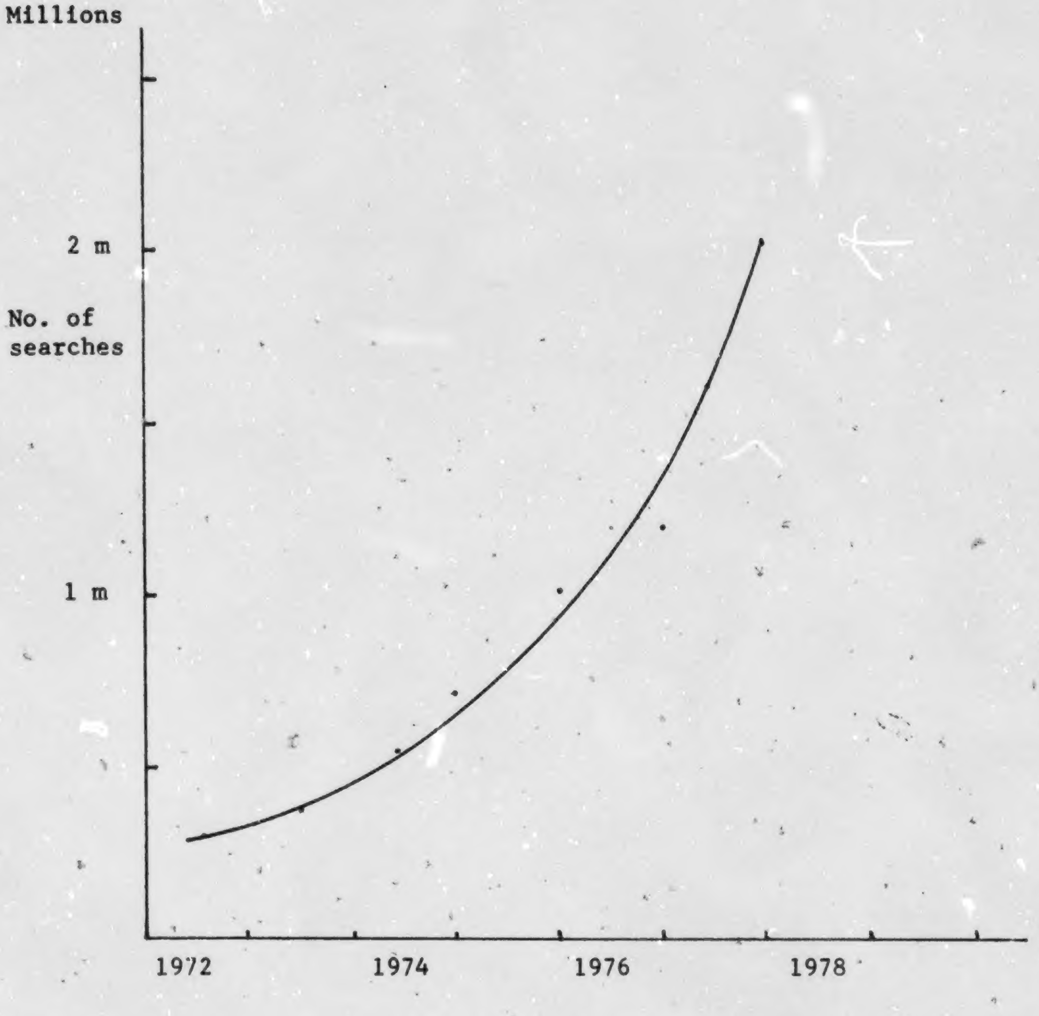
FIGURE 4.1 GROWTH IN ONLINE SEARCHES IN THE U.S.



Sources: Pratt (110) and M. Williams (147)

FIGURE 4.2 GROWTH IN MEDLINE SEARCHES AT NLM

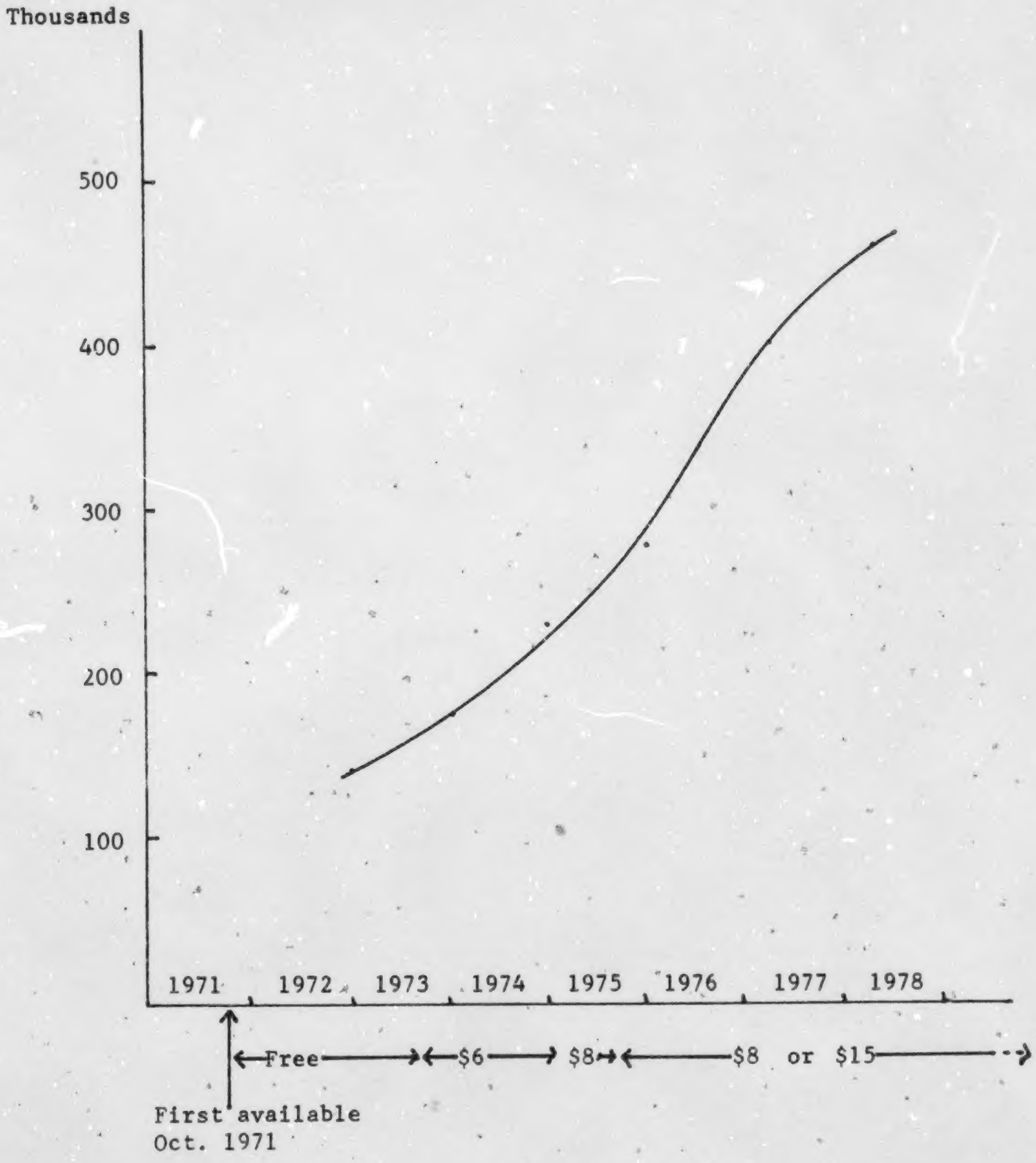


Table 4.1 Relationship of total online searches to population and time, and predictions for New Zealand.

Place	Actual data (A) or prediction (P)	Source	Year	No. of years in operation	No. searches	Searches as % of population	Prediction for N.Z.
Europe	A	Pratt (110)	1975	1	70,000	.02	630
U.K.	P	Holmes (53)	[1980]	2	[50,000]	.09	2,480
U.S.	A	Williams (147)	1974	2	700,000	.32	10,100
Europe	A	Vickery (136)	1977	2-3	200,000	.05	1,580
U.S.	A	Williams (147)	1975	3	1,000,000	.46	14,520
Europe	P	P.A. (104)	[1980]	5-6	[1,230,000]	.33	10,420
U.S.	A	Williams (147)	1977	5	2,000,000	.93	29,360

Note: Figures in [ ] are predictions.

European growth apparently has had a much slower start than the U.S., no doubt mainly due to the lack of cheap telecommunications access to data-bases. However, it is following the same pattern and will no doubt reach similar levels eventually, especially with the introduction of EURONET. For New Zealand, entering the market late, some factors would encourage a high growth rate, for example the wide range of data-bases and substantial backfiles now available. However, telecummunications costs are high at present, and little growth is likely till they fall. Once they do, growth could be rapid and the comparative figures indicate a substantial market.

A substantial proportion of the total online searching is related to the health sciences. In 1977 NLM's data-bases accounted for up to 45% of the U.S. total, (79) and in the University of London 38% of searches are on NLM. (136) In the market survey for Europe it was estimated that up to half the searches would be medicine-related, which would include searches of non-NLM data-bases. (104) MEDLINE is by far the most popular health sciences data-base, accounting for approximately 60% of NLM's online searches, and thus, on its own, might account for almost a quarter of all online searching.

In Table 4.2 equivalent figures are given relating the number of MEDLINE searches to the number of medical practitioners in each country at different stages of online service development. Medical practitioners are not the only MEDLINE users, but it is assumed that the allied health science workers would be in more or less the same ratios to medical practitioners in each country. If growth in New Zealand followed the same pattern as in America, one might expect 0.46 searches per medical practitioner in the second year of operation, which would give a total of approximately 1865 searches. Actual figures for Britain for the first year of limited availability, and predictions for the second year of full availability would seem to indicate a slower growth rate.

How would these figures hold for New Zealand and what factors would affect the growth rate? Price of telecommunications has already been suggested as the main factor slowing growth in Europe and this could apply in New Zealand. However, NLM's experience indicates that in the long term their charges have had an insignificant effect on the number of searches.

Figure 4.2 shows that the price changes have had no effect on the smooth growth curve. However, price has had a significant effect on the total number of hours of searching, which McCarn estimates would be 60% higher if the service were free. (79) Thus it appears that prices correlate with the efficiency of search activities, but not necessarily with the volume. The correlation does not necessarily prove a direct relationship between price and search times; it may simply be that in time both prices and searcher experience and efficiency have increased. Other studies have indicated that sudden price increases do cause a drop in demand, but this is usually only temporary. (36, 136) NLM's success may be due to the fact they initially offered free searches and then only gradually increased charges to their present low level, with the service still being subsidised by the U.S. government as part of NLM's overall operations.

Table 4.2 Relationship of MEDLINE searches to time and number of registered medical practitioners, and predictions for New Zealand.

Place	Actual data (A) or prediction (P)	Source	Year	No. of years available	No. of MEDLINE searches	Searches per medical practitioner	Prediction for N.Z.
U.K.	A	Vickery (136)	1977	[1]	7,000	0.09	380
U.K.	P	Holmes (53)	[1980]	2	[17,000]	0.22	920
U.S.	A	NLM (98)	1972/3	2	141,730	0.46	1,865
U.K.	P	PA (104)	1980	2-3	[35,000]	0.46	1,890
U.S.	A	NLM (98)	1975/6	5	286,250	0.85	3,465
Europe	P	PA (104)	1980	4-6	[600,000]*	1.04	4,255
U.S.	A	NLM (99)	1978	7	460,209	1.36	5,560

Notes: [ ] Figures in [ ] are predictions or approximations.

* Actually searches for medicine, rather than MEDLINE searches.

If this example could be followed in New Zealand it seems likely that growth would follow the same pattern.

In the early stages of development publicity also significantly affects growth rates. It can be used to control the growth to a level which libraries can cope with without too much disruption.

All these factors only affect the rate at which growth moves towards the eventual saturation level, and will not affect the final level. No one yet knows what saturation level is, as it has never been reached.

4.2.2 INSTITUTIONAL LEVEL STATISTICS

It is difficult to find representative statistics with enough background information on which to base predictions. In particular, different studies define their potential user populations in different ways. However, data is presented here for St. George's Hospital Medical Library in London and combined data for five centres involved in the British Library's STEIN (Short Term Experimental Information Network) project.

St. George's is a teaching hospital of the University of London, and has 4,500 potential readers (presumed to include hospital staff and University staff and students). In 1977 the library started to use BLAISE to access MEDLINE. (Access had previously been available only on a limited experimental basis direct from NLM.) In 1977/8 £1000 was budgeted for MEDLINE use, which at £20 per hour and an average of 9.25 minutes per search, would allow approximately 325 searches. The searches were free to the users but the total demand was limited by the budget. In 1978/9 £2000 was requested for the MEDLINE budget. (109)

The potential readership of the three medical libraries of the University of Otago is 7324 taking into account the same groups (i.e. including University staff and students, and all Hospital Board qualified medical and paramedical staff). At the level of searching expected by St. George's in 1978/9, the three libraries could expect a total of over one thousand searches per annum, as shown below.

	Potential Users	Year	Searches per potential user p.a.	Searches p.a.
St. George's	4500	1977/8	0.07	325
	4500	1978/9	(0.14)	(650)(predicted)
U. of Otago Medical Libraries	7324		(0.14)	(1025)

The medical part of the British Library's STEIN project involved five main centres: Edinburgh University Medical School; Manchester University Medical School; the Royal Postgraduate Medical School in London; the Welsh National School of Medicine, Cardiff; and the Wessex Regional Health Authority based in Southhampton. (55) This gave a range of institutional types with both academic and hospital staff well represented. In 1975 the B.L. provided limited resources to each centre to enable it to access NLM online via ARPANET (a private U.S. Department of Defence telecommunications network).

MEDLINE searches were provided free to users but were limited both by the resources and by telecommunications breakdowns. Potential users were considered as University staff and students and hospital medical staff only. Extrapolating the results from the six month project to an annual basis gives the following figures.

	Potential Users	Year	Searches per potential user p.a.	Searches p.a.
5 STEIN centres	10,364	1975	0.18	1858
U. of Otago Medical Libraries	2,269		(0.18)	(410)

Comparative figures for the University of Otago Medical Libraries (excluding non-medically qualified hospital staff) gives a predicted rate of over 400 searches per annum.

4.3 UNIVERSITY OF OTAGO SURVEYS

4.3.1 PREVIOUS USE OF CBIS

The only CBIS which have been available in New Zealand are batch services, mainly supplied from Australia. Previous use of batch services is not considered to be any indicator of future use of online services. They are really two quite different kinds of service, as already indicated in Chapter 3, and overseas statistics show that online searching levels bear no relationship to previous batch levels. For example, the number of NLM online searches in 1973 was already almost 15 times higher than the peak MEDLARS demand. (77) Nevertheless the statistics are of interest in showing the distribution of search requests and the reaction of users.

Appendix 4 gives figures supplied by the Australian National Scientific and Technological Library (ANSTEL) of MEDLARS searches performed for New Zealand users. The number of searches has been falling since charges were introduced and in 1978 was only 37. As indicated in Chapter 3, some users may be finding other more satisfactory sources for their computer-based searches. SDI searches have also fallen from 88 to 23.

The user survey also supplied some information on previous use of CBIS and this is given in Appendix 3, Tables 4.2.1 to 4.2.3. Only 47% of the respondents were aware of the availability of CBIS before receiving the questionnaire, and 15% had actually used a CBIS, i.e. almost a third of those who had heard of them. The number of users of each data-base were:

MEDLARS	16
BIOSIS	3
Psychological Abstracts	2
3 other data-bases	1 each

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The users' evaluations of the CBIS were generally very good. On the scale Poor - Moderate - Fairly good - Good - Excellent, the percentage giving good or excellent for three criteria were:

Value for money	74%
Relevance	68%
Timeliness	63%

Timeliness was the criterion with lowest satisfaction, which reinforces what has been said earlier about the disadvantages of batch services. The actual estimates for percentage of the references supplied which were relevant, were:

% Relevance =	Above 60%	40-60%	Below 40%
% replies	21%	42%	37%

Despite the fact that most users' printouts were only 40-60% relevant, they still judged this as a good or excellent result. Overseas studies also show that although many references may not be of relevance to the specific question, most users do not object, because the references may be of general background interest.

4.3.2 POTENTIAL USE OF CBIS

4.3.2.1 RELIABILITY OF SURVEY RESULTS

Before discussing the actual results of the questionnaire, it is important to consider how reliable these results are as a basis for prediction. The two main sources of inaccuracy would be bias in the sample due to non-response, and inaccuracy in the respondents' answers due to their unfamiliarity with the services offered and inability to predict future use.

Appendix 2 gives an analysis of the user population and the sample in terms of user categories and response or non-response. Of the 374 questionnaires distributed 131 (35%) were returned completed and 34 (9%) were returned uncompleted because the people had moved away from the area, died, or for some other reason were no longer library users. Adjusting the total potential user population (as defined in Chapter 2) and the sample size for this "dead" category gives 3090 and 340 respectively, and gives an adjusted response rate of 38.5%. This is still a fairly low response rate, and we must therefore consider whether the reasons for non-response might bias the results in any way.

One possible reason for non-response is lack of interest in library use and CBIS, and this would bias the respondent group towards those most likely to use the services, and therefore would give unrealistically high predictions. To counteract the bias one could assume that all the non-responders would be non-users. The other extreme is to assume that the respondent group is completely representative of the sample, and therefore of the population as a whole. The first assumption gives a low estimate and the second a high estimate.

The truth is probably somewhere between the two. It is known that some of the non-responders at Canterbury Medical Library would be interested in CBIS, and even included some previous MEDLARS users.

In addition, if the response was biased towards likely users, one might expect a proportionately high response from user categories (eg. medical staff) which overseas studies have shown to be heavier users. In fact, the response rate from medical and paramedical staff was very similar as shown in Table 4.3

Table 4.3 Analysis of user categories by response.

	% Replied	% Didn't reply	% "Dead"	Total
Medical	33	54	11	100
Paramedical	34	53	11	100
Students	27	68.5	4.5	100
Others	48	52	-	100
Overall (131 replies)	35	56	9	100

Table 4.4 Analysis of population, sample and response by user category.

	% of population	% of sample	% of replies
Medical	69	39.3	38.5
Paramedical		36.6	38
Students	17.6	18	14.5
Others	13.3	6	9
Totals	100	100	100

Table 4.4 also shows that the respondents were fairly representative of the population, at least in terms of user categories. There is a low response from students but this is probably because the questionnaire was distributed at the end of the term when many students were leaving.

The under-representation of the "other" category is probably artificial and due to different categorisation of these people in the sample from that in the original registration. Some people registered as "others" were probably assumed to be paramedical, or possibly medical or students, when the names in the sample were categorised.

Nevertheless, to be safe whenever predictions are made from the survey results, high and low estimates are given based on the alternative assumptions explained above.

Inaccurate answers from the respondents are more difficult to allow for. In Chapter 2 the weaknesses of market surveys were discussed and the steps taken to improve the reliability of the answers were explained.

Tests of internal consistency were also included within the questionnaire in order to assess how realistic the answers were. Previous literature searching habits are related to anticipated CBIS use to see if the answers bear any relationship. Although one would not expect a match (overseas studies indicate that CBIS usually cause an overall increase in literature searching and library use) the answers are reasonably close. The differences are discussed below.

4.3.2.2 RETROSPECTIVE LITERATURE SEARCHES

Question 5.1 in the questionnaire asked:
"How often do you think you might use automated searches of the following data-bases for retrospective literature searching, if the cost of a typical search (e.g. yielding 20 references) was each of the various alternatives?" (Free to $50.)
Tables 4.5 and 4.6 summarise the answers for free and $5 searches for each data-base, and on that basis give predictions for the previously defined potential user population of the Medical Libraries (3090).

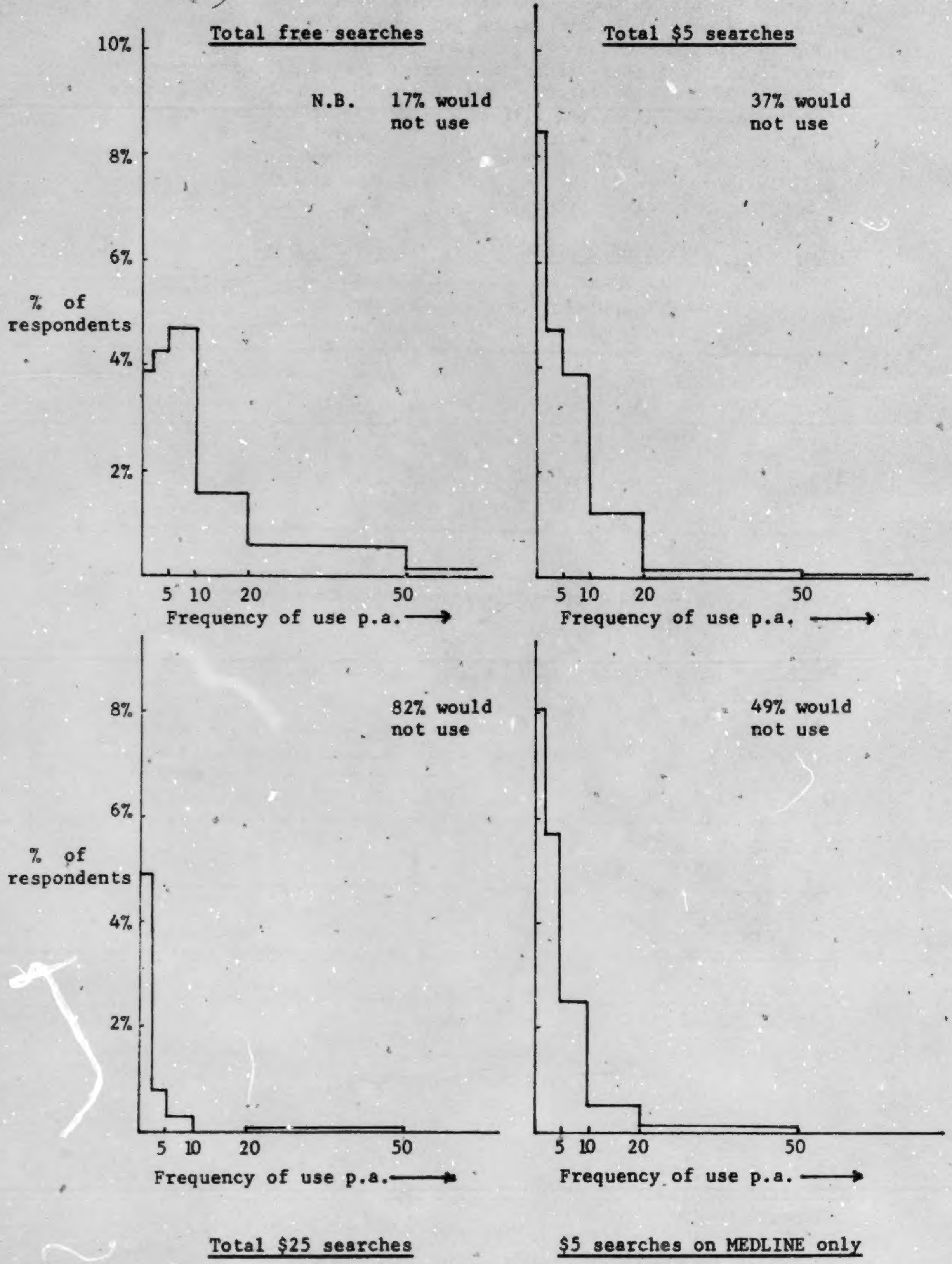
Table 4.5 Estimated use of free retrospective searches

	% of respondents would use	Average Searches per user p.a.	Predictions of searches p.a. for whole population	
			High	Low
MEDLINE	64	13.8	27,400	10,550
BIOSIS	27	6.2	5,150	2,000
SCISEARCH	23	11.6	8,200	3,150
Excerpta Medica	19	8.9	5,250	2,000
Psychological Abstracts	18	8.6	4,650	1,800
CaCondensates	11	4.5	1,600	600
Other data-bases	13	9.1	3,650	1,400
Total searches on any data-base	83	21.7	55,900	21,500

Table 4.6 Estimated use of retrospective searches at $5 each

	% of respondents would use	Average Searches per user p.a.	Predictions of searches p.a. for whole population	
			High	Low
MEDLINE	51	6.4	10,150	3,900
BIOSIS	18	3.7	2,100	800
SCISEARCH	14.5	6.4	2,900	1,100
Excerpta Medica	12	5.5	2,100	800
Psychological Abstracts	11	5.1	1,700	650
CaCondensates	5	3.6	600	200
Other data-bases	11	5.0	1,650	650
Total searches on any data-base	67	10.2	21,200	8,100

FIGURE 4.3 FREQUENCY DISTRIBUTION OF EXPECTED USE OF CBIS AND MEDLINE AT VARIOUS PRICE LEVELS



Total free searches

Total $5 searches

Total $25 searches

$5 searches on MEDLINE only

It can be seen that the $5 charge makes a substantial difference in estimated use, both by decreasing the proportion of users and by reducing the average numbers of searches per user p.a. Figure 4.3 gives frequency distributions for overall use of all data-bases, for free, $5 and $25 searches, and it can be seen that the pattern of expected use decreasing with price increase continues. The frequency distribution for use of MEDLINE searches at $5 each is also presented. MEDLINE accounts for approximately half of the total estimated use of CBIS. Table 4.7 show how the predicted use of MEDLINE is affected by price.

Table 4.7 Estimated MEDLINE use at different prices

	% of respondents would use	Av. searches per user p.a.	Predictions of searches p.a for whole population	
			High	Low
Free	64	13.8	27,400	10,550
$5	51	6.4	10,150	3,900
$15	27	4.3	3,650	1,400
$25	13	3.4	1,350	500
$50	6	3.5	650	250

Comparison of the expected use of free CBIS with the present use of corresponding abstracting and indexing journals shows that the figures are fairly consistent.

Table 4.8 Comparison of Index Medicus literature search frequency with anticipated MEDLINE use.

	% of users in each frequency category					
	0	1-5	6-10	11-20	21-50	51-100
Index Medicus literature searches in last 12 mo.	47	24	15	10	4	0
Expected use p.a. of free MEDLINE service	36	24	16	11	11	2

Table 4.9 Comparison of use of abstracting and indexing journals with use of corresponding CBIS if free

	% of respondents using A & I	% of respondents would use ≡ CBIS
Index Medicus	53	64
Biological Abstracts	5	27
Chemical Abstracts	4	11
Excerpta Medica	4	19
Psychological Abstracts	11	18
Science Citation Index	9	23
Total using any A&I/CBIS	66	83

Tables 4.8 and 4.9 show that expected free use of the computer-based services is slightly higher than present use of corresponding printed services. This would be expected for the reasons given below.

a) We already know that some users' information needs are unfulfilled, mainly because of their lack of time. The users expect to be able to fulfil these needs using CBIS, and so the overall use is higher.

b) Abstracting and indexing journals are not the only tools for literature searches. Although 96% of the users said they did literature searches in the previous 12 months, only 66% had used abstracting and indexing (A & I) journals for literature searching, and only 56% for quick reference, (see Appendix 3, Tables 2.3 and 2.4) and there is a substantial overlap between the 66% and the 56%. CBIS may have been considered more efficient than the alternative manual methods (following up references in bibliographies; library catalogues, etc.).

c) Not all the A & I journals are held in all three libraries. The increased availability of the data-bases through CBIS would almost certainly increase their use.

d) The novelty of CBIS would probably attract some use initially.

The effect of a number of variables on expected use of CBIS was investigated. Prior awareness of the availability of CBIS made no significant difference to expected use. The employer category does make a significant difference, not so much in the expected use of free services, but in the rate that use drops off as the price increases. The percentage of students who would use CBIS if free is relatively high, but falls off rapidly as the price increases, whereas expected use by University employees is much less affected by price. (See Appendix 3, Figure 5.1.1).

This is probably due at least partly to the sources of funds each group would expect to use. Most students expect to use their own money whereas most University employees would expect to use Department or research funds. (See Appendix 3, Table 5.3) Expected use is similar for each of the professional fields except paramedicine, which is rather lower. Again the difference is emphasized by price level. (See Appendix 3, Table 5.1.2)

The effect of work activities on anticipated use of CBIS was not analysed because NLM had supplied statistics on the purposes of their online searches (79) which are considered to be a more reliable indicator of future use in New Zealand.

Table 4.10 Percentage distribution by purpose of search (NLM online data)

	April 1975	Oct. 1977 (estimate)
Patient care	17	25
Education	14	13
Research	44	49
Other	19	13
Unknown	6	-
Total	100	100

4.3.2.3 CURRENT AWARENESS SERVICES

The questionnaire asked for the maximum price people were prepared to pay for computer based current awareness services. Table 4.11 summarises the results. Only 7% of the respondents were prepared to pay $50 or more per annum for computer-based SDI (selective dissemination of information). Thus for a service costing $25 p.a. the high and low estimates for the potential user population of the three medical libraries are 930 and 350 users respectively.

Table 4.11 Anticipated use of CBIS current awareness at various prices and comparison with present use of A & I journals for current awareness.

	% using A & I	% of respondents who would use CBIS, if:		
		Free	At least $10 p.a.	At least $25 p.a.
Index Medicus	10	66	53	23
Current Contents	18)	30	23	11
Science Citation Index	4)			
Biological Abstracts	5	24	16	7
Excerpta Medica	3	21	13	2
Psychological Abstracts	5	20	13	7
Chemical Abstracts	2	9	6	2
Other	4	11	9	2
Any of the above	32	83	70	30

Again, expected use of CBIS is higher than present use of abstracting and indexing journals for current awareness. The reasons given above for retrospective searching would apply again, but another factor would be that most A & I journals are not designed for current awareness use, whereas the computer-based SDI is. This is particularly noticeable in the relative use of Current Contents and Index Medicus and their computer-based equivalents. Current Contents is the most popular current awareness tool at present, but Index Medicus/MEDLARS would be far more popular in a computer based service. Presumably, people prefer the subject coverage of Index Medicus, but find the printed index less useful for current awareness than Current Contents, which is far more up-to-date, and specifically designed as a current awareness tool. The respondents ratings of the value of A & I journals as current awareness sources did not appear to significantly affect their expected use of CBIS, which supports the view that computer-based SDI is seen as a different kind of service.

Again, there is a slight difference in willingness to pay for computer-based current awareness services, depending on the source of the money.

4.4 CONCLUSIONS

The more important estimates of future use of CBIS retrospective searches in New Zealand are summarised here to see how they compare.

a) For New Zealand

	1st year	2nd year	5th year
All online searches (Table 4.1)	630	2,480-10,100	10,420-29,360
MEDLINE (Table 4.2)	380	920- 1,865	3,465- 4,255

b) For the University of Otago Medical Libraries

	1st year	2nd year	
MEDLINE (STEIN)	410		
MEDLINE (St.George's)	500	1025	
	$25	$5	Free
MEDLINE (Survey)	500-1,350	3,900-10,150	10,550-27,400

It can be seen that the MEDLINE searching rate predicted by the survey at the $25 level is roughly equivalent to the first to second year estimates from the other sources. Judging by present MEDLARS statistics (Appendix 4) the University of Otago medical libraries might account for about 75% of New Zealand's MEDLINE searches. The $5 level MEDLINE searching rate is slightly higher than the overseas rates at five years. When considering the effects of price in the survey results one should bear in mind the growth patterns for online searching and NLM's experience of small price increases making little difference to eventual searching levels. The $5 MEDLINE searching rate is an indication of demand, and this demand will probably be met eventually, regardless of the actual price at that time, as long as it is within reasonable limits. Whether the predicted level of free searching would ever be reached is questionable. It may, in fact, be necessary to always have some small charge in order to discourage wasteful use.

Use in the first year an online service is offered will probably bear less relationship to potential demand than to other factors, such as publicity and staff availability. However, in the second year the University of Otago Medical Libraries might expect a total of about 1,000 MEDLINE searches.

CHAPTER 5

DATA - BASES

5.1 INTRODUCTION

Obviously MEDLINE is the data-base of prime medical significance, and because of its broad coverage, wide availability and low prices it has been popular with non-medical workers too. However, it is not necessarily the best data-base for every search in a health sciences library, and one of the advantages of online access is that it greatly increases the range of data-bases available for searching. This Chapter aims to identify many of the data-bases likely to be used if and when they can be accessed online from New Zealand at economical rates. Some indication of likely use is given and a number of comparative studies are reported. Finally the data-bases and the networks currently offering them are outlined.

5.2 USER SURVEY

The user survey tried to establish the relative use of different data-bases if they were all available at the same price (a situation unlikely to arise in the near future). Tables 4.5 and 4.6 give the results for free and $5 searches respectively. MEDLINE accounts for about half the estimated searches and is followed in popularity order by SCISEARCH, Excerpta Medica and BIOSIS, Psychological Abstracts and CaCondensates. The order is more or less the same for current awareness services. Data-bases which were mentioned more than once under the 'other' category were AVLINE, CANCERLINE and CANCERPROJ, SOCSCISEARCH and TOXLINE. Table 5.1 compares the predicted use at $5 and $25. Only 10% of the respondents were prepared to pay $50 for a retrospective search of any data-base, and nearly all of these were for MEDLINE.

Table 5.1 % of respondents who would use each data-base at $5 and $25

	$5	$25
MEDLINE	51	13
SCISEARCH	14.5	3
BIOSIS	18	5
Excerpta Medica	12	2
Psychological Abstracts	11	3
CaCondensates	5	1.5
Other data-bases	11	1.5

The respondents were obviously limited in their answers to those data-bases they had heard of, which are probably only a fraction of those which might be relevant on occasions. However the most important ones are represented.

5.3 OVERSEAS DATA-BASE STATISTICS

Foreman reports on the relative use of the data-bases then available by the University of Minnesota Bio-Medical Library, during a three month period in 1974/75. (39)

Table 5.2 Relative data-base use at University of Minnesota

MEDLINE	74%
TOXLINE	7%
Psychological Abstracts	7%
BIOSIS	5%
ERIC	2%
CANCERLINE	2%
CATLINE	1.5%

SCISEARCH and Excerpta Medica were not available to the users, and BIOSIS had only been available for the last two weeks of the three months.

Table 5.3 gives the distribution of data-base usage within subject fields, from the University of London large-scale CBIS evaluation study. (136) Online retrospective searches were available from NLM, Lockheed and S.D.C. Excerpta Medica was not available.

Table 5.3 Distribution of data-base use within subject fields, U. of London

	Medicine	Physiology	Bio-chemistry	Pharmacy	Health Services	Psychology
MEDLINE	85	73	65	67	73	10
BIOSIS	1.5	21	27	2	8	1
Psychological Abstracts	7				8	69
SCISEARCH	3.5	2	2		1	1
CaCondensates	1	2	6	25	1	
ERIC					1	9
SOCSCISEARCH	1				1	8
Others	7 @ < 1%	2	2 @ 2%	4 @ 2%	5 @ 1%	7 @ < 1%
Total	100%	100%	100%	100%	100%	100%

The range of data-bases available from NLM has been steadily increasing, although MEDLINE is still the most used as Table 5.4 shows. Many of the small specialist data-bases are not available online outside the U.S.A.

Table 5.4 Percentage of NLM online searches on each data-base, 1977/78 (99)

	%
MEDLINE	59
CATLINE*	19
TOXLINE	6
CHEMLINE	4
CANCERLINE	3
SDILINE	2.5
SERLINE	1.5
AVLINE	1.3
RTECS	0.8
CANCERPROJ	0.5
EPILEPSYLINE	0.3
BIOETHICS	0.2
TDB (Toxicology Data Bank)	0.2
CLINPROT	0.1
	100%

*CATLINE is the NLM's book catalogue online. It is mainly used for library cataloguing information rather than for literature searching.

From these statistics it can be seen that, after MEDLINE, BIOSIS and Psychological Abstracts have been the data-bases most used by health scientists. SCISEARCH and Excerpta Medica might be expected to join them in popularity now they are equally widely available. Each might generate about a tenth of the searches done on MEDLINE. Of the NLM data-bases only TOXLINE, CHEMLINE and CANCERLINE might approach the same levels as the four large commercial data-bases.

5.4 COMPARATIVE EVALUATIONS

Chapter 3 covered the evaluation of CBIS in general and in relation to manual searching. Here we are concerned with choosing between data-bases for a particular search. The criteria for making the choice are listed below. (58, 88, 143)

a) Subject coverage. The subject coverage of the data-base in relation to that of the query is the most important factor in data-base choice. The coverage of data-bases likely to be used in health sciences libraries is summarised in Table 5.6 at the end of this Chapter.

b) Comprehensiveness. The size, time span, and growth rate of the data-base, the number of journals covered, the different types of publications covered (e.g. conference proceedings, reports), and how comprehensively or selectively each publication is covered, are all indicators of how complete the coverage is in the subject field.

c) Currency. The average time lag between the publication of articles and their appearance in the data-base, affects the usefulness of the references. The frequency of updating of the data-base will affect its currency.

d) Indexing. The type of index vocabulary (controlled or uncontrolled), the exhaustivity of indexing, and the elements in the citation available for searching will all affect the results. Most searchers prefer controlled vocabularies. (139) In addition, for the searcher to understand the indexing, published indexing aids are necessary.

e) Abstracts. The inclusion of abstracts, and sometimes other special elements in the citation, can enhance the value of the results.

f) Availability. The availability of the data-base on networks accessible by the library, and at the specific time required are important criteria.

g) Cost. There is a wide variation in charges for different data-bases and this may affect the choice.

A number of comparative studies have been made of data-bases with similar or overlapping coverage in the medical field. In general, each data-base has its strong points and the searchers should exploit these in making the choice between data-bases.

Excerpta Medica has similar subject coverage to MEDLARS though it does seem to be better on drug literature. Powell estimates that 95% of the top 200 (most frequently cited) pharmaceutical journals are covered by Excerpta Medica. (112) Ashmole (4) and Madden (82) confirm that DRUGDOC (a subset of Excerpta Medica) produces about twice as many relevant references as MEDLARS on drug-related searches. Excerpta

Medica gives good coverage of European literature, however, this does mean that there are many foreign language references included, which some comparisons have indicated are of minor value and difficult to obtain. (4, 112)

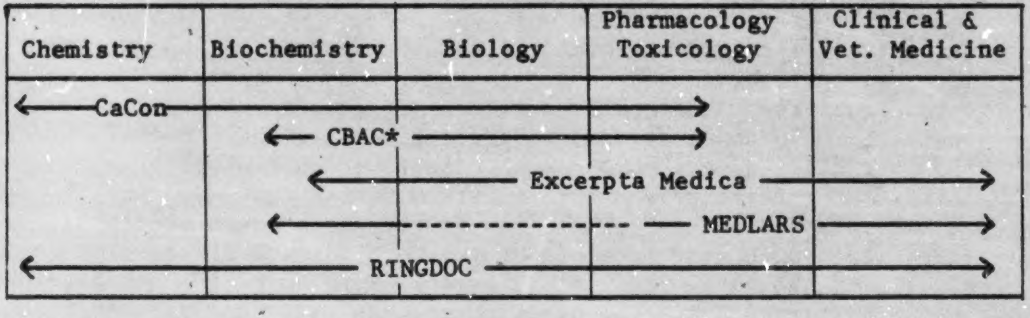
On currency and inclusion of abstracts MEDLARS and Excerpta Medica rate about the same. Indexing procedures differ and this affects the utility of each for different types of searches. MEDLARS has a strictly controlled hierarchical vocabulary, whereas the Excerpta Medica MALIMET thesaurus has little control on synonyms and only a loose structure. Therefore, with MALIMET more complex search strategies have to be devised in order to achieve high recall. This is reflected in a comparison of searches on biological, medical and veterinary subjects in which MEDLARS gave 33% recall and Excerpta Medica gave 18%. Conversely the average precision ratios for MEDLARS and Excerpta Medica were 38% and 55% respectively. (134) Only 20% of the total relevant references were found by both data-bases. MEDLARS performed better on broader searches, and Excerpta Medica on the more specific searches and on drug-related topics. Because the vocabulary is less strictly controlled Excerpta Medica is better on new concepts, particularly new drugs, which may take some time to appear in MeSH.

Thus the choice between the data-bases should be influenced by how closely the subject of the query is represented in the two vocabularies. On cost and availability MEDLARS is well ahead, although the situation for Excerpta Medica should improve now it has been added to the Lockheed DIALOG system.

A recent comparison of BIOSIS and MEDLARS again shows how different indexing policies can be exploited for different searches, so that the two data-bases can be used in a complementary way. (133) In this case the different software capabilities for MEDLINE on ELHILL 3 from NLM and on STAIRS from the State University of New York (SUNY) can also be exploited. (The two software systems are compared in a paper by Humphrey (59)). The different coverage of the data-bases also means that each may produce unique references on any one search. The unique references from BIOSIS are often for monographs or conference proceedings which are better covered than in MEDLARS. This study concludes: "... because of the differences in indexing, subject content, and the types of literature covered, for comprehensive coverage of biology and biomedicine, it is essential for biomedical libraries to have access to both data-bases."

In the drug information field there have been a number of data-base comparisons. (4, 82, 117) Excerpta Medica or its subfile DRUGDOC are generally the most productive data-bases in this field, followed by MEDLARS. These two have already been compared above. The Derwent data-base, RINGDOC, comes next but this is only available online to subscribers to the print version. TOXLINE was found to be inferior to MEDLINE in terms of recall and coverage. In this field the currency of the data-base is very important and in one case ASCA (a current awareness service based on SCISEARCH) was selected for use because the time lag is only one week. (4) It is interesting to note that ADIS, (Australasian Drug Information Service) the New Zealand, card-based drug information service, although less comprehensive in coverage, was found to be more up-to-date than MEDLARS and DRUGDOC. (32) In terms of cost per relevant reference, MEDLARS is usually the most cost effective. Smith gives the following comparison of subject coverage of some relevant data-bases. (117)

Table 5.5 Comparison of subject coverage of some drug-related data-bases



*CBAC (Chemical-Biological Activities) is a subset of CaCondensates, and is included in TOXLINE.

A similar range of data-bases is of interest to the field of toxicology. The Cleveland Poison Information Center compared a number of data-bases for performance in relation to the subject "therapy of poisonings". MEDLINE was the most satisfactory in terms of coverage, recall, frequency of update and cost. Sample searches on TOXLINE and BIOSIS were found to add very few new relevant references to those already found by MEDLINE. Excerpta Medica was only available from Informatics at the time, and searches could not be restricted by language, or to human cases, so many poor quality references were produced. (116)

These comparisons give some idea of how complex the choice between data-bases can be. However, for New Zealanders in the near future the choice will largely be determined by availability and cost.

5.5 SUMMARY OF DATA-BASES RELEVANT TO HEALTH SCIENCES

This section aims to give an idea of the range of data-bases available that could be of use in health science libraries. The scope of each data-base is summarised, and American and Australasian network processors offering online services (or batch, if online is not available) are indicated. A number of more comprehensive catalogues of data-bases are available. (22, 95, 145) New data-bases are continually appearing and prices changing, so users should refer to the catalogues of the CBIS brokers for the most up-to-date information, bearing in mind that different brokers often use slightly different names for the same data-base.

Table 5.6 Notes:

a) Abbreviations used for CBIS brokers:

NLM : U.S. National Library of Medicine
SDC : Systems Development Corporation (ORBIT)
BRS : Bibliographic Retrieval Services Inc.
SUNY : State University of New York
NLA : National Library of Australia
CSIRO : Commonwealth Scientific & Industrial Research Organisation (Australia)
DIC : Australian Dept. of Industry and Commerce
NZDSIR : N.Z. Dept. of Scientific & Industrial Research
NZMOWD : N.Z. Ministry of Works & Development
NZ MAF : N.Z. Ministry of Agriculture & Fisheries.

b) Offline Services are only listed for Australia and New Zealand, and the Australian services are not covered comprehensively. Only the most obvious source is given. Although "offline" as far as the end user is concerned, the searches may in fact be performed online between NLA and the U.S.A., rather than batch processing in Australia.

c) Cost All costs are quoted in the currency of the country originating the service, i.e. U.S. dollars for NLM, SUNY, Lockheed, SDC, BRS and Informatics; Australian dollars for NLA, CSIRO, AUSINET & DIC. For online searching the price per hour and the charge for offline prints (per reference or per page) are given. For offline retrospective searches the price per search is quoted, and for SDI the price per annum. The cost of telecommunications is excluded, except for AUSINET prices which include telecommunications within Australia.

d) AUSINET charges AUSINET has an absolute minimum monthly charge of A$350 which allows 10 hours of searching. Data-base royalties would be charged for some data-bases on top of the $35 per hour.

e) BRS charges The charges are on a scale which depends on the volume of use. The rates quoted here would apply to a 60 hour per year contract, which is considered to be the rate most likely to apply to a consortium of N.Z. medical libraries.

f) NLM charges There are two rates: U.S. $15 and $8 for peak and offpeak hours.

g) Time span The dates quoted give the period for which the data-base is available. Not all processors (particularly AUSINET) have complete backfiles, and some (BRS, NLM) have only the latest years online, and earlier files available for offline searching. In some cases the larger data-bases are split, by date, into two or more files, though all are available online.

h) New data-bases BRS indicates they are planning to add some new data-bases of interest:

MEDOC (Government documents in the health sciences)
DRUG INFO
ALCOHOL USE/ABUSE

Table 5.6 Data-bases of Medical and Biomedical significance

Table 5.6.1 Available from the U.S. National Library of Medicine

Data-base	Published equivalent	Scope	Availability	Cost
MEDLARS/ MEDLINE	(Index Medicus (Index to Dental Literature (International Nursing Index	Covers clinical, preclinical and experimental medicine and related biomedical subjects. 2.5 million references from 3000 biomedical journals from 1966 on.	Online: NLM SUNY BRS NLA Offline: NLA	$8 or $15 + 12¢ per p. $8 or $15 + 12¢ per p. $10 + 12¢ per p. Free $20; SDI $75 p.a.
AVLINE	NLM AVLINE Catalog	Information on approximately 4,500 audiovisual instructional materials in health sciences, from 1975 on.	Online: NLM Offline: NLA	$8 or $15 + 12¢ per p. $50 per search
BIOETHICSLINE	Bibliography of Bioethics	Comprehensive cross-disciplinary collection of references to print and non-print materials on bioethical topics, including human experimentation, abortion etc. Includes 7,000 references, from 1973 on, to journal and newspaper articles, legal information, etc.	Online: NLM	$8 or $15 + 12¢ per p.
CANCERLIT	(Cancer Therapy Abstracts (Carcinogenesis Abstracts (ICRDB (unpublished)	Based on the National Cancer Institute's International Cancer Research Data Bank. 100,000 references from 1967 on. (128)	Online: NLM Offline: NLA	$8 or $15 + 12¢ per p. $50 per search
CANCERPROJ	None	Descriptions of 16,000 on-going cancer research projects and clinical trials.	Online: NLM Offline: NLA	$8 or $15 + 12¢ per p. $50 per search
CATLINE	NLM Current Catalog	Cataloguing information for books, serials and technical reports catalogued by NLM since 1965. Approximately 200,000 records and growing by 15,000 p.a.	Online: NLM NLA	$8 or $15 + 12¢ per p. Free

Table 5.6.1 (Continued)

Data-Base	Published equivalent	Scope	Availability	Cost
CHEMLINE	None	A chemical dictionary file containing records for all chemical substances cited in TOXLINE. 250,000 records each contain preferred chemical name, synonyms, molecular formula and structure information and CAS registry number.	Online: NLM	$8 or $15 + 12¢ per p.
CLINPROT	None	Contains over 1,000 summaries of clinical investigations of new anti-cancer agents and treatment techniques.	Online: NLM Offline: NLA	$8 or $15 + 12¢ per p. $50 per search
EPILEPSYLINE	Epilepsy Abstracts	Covers investigative and clinical aspects of epilepsy and basic neurosciences. Approx. 25,000 references from 3,500 journals from 1945 on.	Online: NLM	$8 or $15 + 12¢ per p.
HISTLINE	Bibliography of the History of Medicine	Includes historical references from MEDLARS plus books and journals not indexed for Index Medicus. About 37,000 citations from 1970 on.	Online: NLM	$8 or $15 + 12¢ per p.
HLI	Hospital Literature Index	Covers planning, organisation & financing of health care and management of health care facilities. 300 journals are scanned & supplemented by references from MEDLINE, not previously covered by Hospital Literature Index. Coverage of non-serial sources is expected.	Online: NLM	$8 or $15 + 12¢ per p.
LADB	None	Laboratory Animal Data Bank contains descriptive information on animal strains & provides comparative data on experimental laboratory animals.	Online: NLM	$8 or $15 + 12¢ per p.

Table 5.6.1 (Continued)

Data-Base	Published equivalent	Scope	Availability	Cost
RTECS	Registry of Toxic Effects of Chemical Substances	Contains toxicity data for approximately 21,000 substances, including toxic effects, thresholds, standards etc. Indexed from 60,000 synonyms, and also by animal species, route of administration, and many other access points.	Online: NLM Offline: NLA	$8 or $15 + 12¢ per p. $50 per search
SDILINE	Index Medicus	The latest month of the MEDLINE tapes.	Online: NLM NLA	$8 or $15 + 12¢ per p. Free
SERLINE	Health Sciences Serials	Contains approx. 35,000 records representing all serials and numbered congresses currently received by NLM. Gives locations for about 6,500 journal titles. Designed to support inter-library loan activities.	Online: NLM Offline: NLA	$8 or $15 + 12¢ per p. $50 per search
TDB	None	Toxicology Data Bank. Records of 4,000-5,000 chemicals containing evaluated textual & numerical data on chemistry, physical properties, pharmacology, toxicology, manufacture, use, toxicity values, lethal dose, etc. Can be accessed by MeSH headings, text words, and chemical substructure searching. (103)	Online: NLM	$8 or $15 + 12¢ per p.
TOXLINE	None	Covers toxicology, analytical methodology, adverse drug reactions, environmental pollutants & hazardous products. 800,000 references selected from 10 different sources including MEDLARS, Biological Abstracts, Chemical Abstracts, International Pharmaceutical Abstracts, etc. (67)	Online: NLM	$8 or $15 + 12¢ per p.

Table 5.6.2 Data-bases available from other operators.

Data-Base	Published equivalent	Scope	Availability		Cost
AGRICOLA (Previously called CAIN)	(Bibliography of (Agriculture (National Agricultural (Library Catalogue	Worldwide coverage of journal and monographic literature on agriculture and related subjects, including nutrition, veterinary medicine, and pollution. Over a million references from 1970 on. (24)	Online:	Lockheed	$25 + 5¢ per ref.
				SDC	$35 + 6¢ per ref.
				BRS	$25 + 15¢ per p.
			Offline:	NLA	$50
				CSIRO	SDI $50 p.a.
				NZ MAF	Free
			(included in	AGRIS)	
BIOSIS	(Biological Abstracts (Bioresearch Index	Covers all aspects of biosciences and medical research from 1969 on. Contains 2.5 million references from 8,000 journals, plus reports, symposia, etc. This is the major English language service providing worldwide coverage of research in the life sciences.	Online:	Lockheed	$45 + 10¢ per ref.
				SDC	$65 + 10¢ per ref.
				BRS	$40 + 15¢ per p.
				SUNY	?
				NLA	Free ?
			Offline:	NLA	$50; SDI $75 p.a.
CAB	26 CAB abstracting journals	Commonwealth Agricultural Bureaux Abstracts cover agriculture & biology and include Nutrition Abstracts and reviews, Review of Medical & Veterinary Mycology, and Index Veterinarius. Over ½m. references to journal articles, books, reports etc. from 1973 on. About 10% of the references are on nutrition.	Online:	Lockheed	$65 + 15¢ per ref.
			Offline:	NLA	$50; SDI $150
				NZ MAF	Free
			(included in	AGRIS)	
CA CONDENSATES (CACON, CHEMCON)	Chemical Abstracts	Indexes the world literature of chemistry, including biochemistry; organic, macromolecular, physical and analytical chemistry, and chemical engineering. Almost 3 million references to journals, reports, patents, symposia etc. 1970 on.	Online:	Lockheed	$45 + 16¢ per ref.
				SDC	$60 + 12¢ per ref.
				BRS	$29 + 15¢ per p.
				AUSINET	$35 + 5¢ per p.
			Offline:	NLA	$20 per search
				CSIRO	SDI $100 p.a.
CHILD ABUSE AND NEGLECT	None	Produced by the U.S. National Center for Child Abuse and Neglect. Covers (1) on-going research project descriptions, (2) U.S. service program listings, (3) bibliographic references.	Online:	Lockheed	$35 + 10¢ per ref.
			Offline:	NLA	$50 ? per search

Table 5.6.2 (Continued)

Data-Base	Published equivalent	Scope	Availability	Cost
COMPENDEX	Engineering Index	Worldwide coverage of 3,500 journals, books, reports, and proceedings in engineering, from 1970 on. Includes biomedical engineering.	Online: Lockheed SDC AUSINET Offline: NLA DIC NZ MOWD	$65 + 10¢ per ref. $65 + 10¢ per ref. $35 + 5¢ per p. $20 per search SDI $120 p.a. Limited availability.
COMPREHENSIVE DISSERTATION ABSTRACTS (DATRIX)	Dissertation Abstracts International	Multidisciplinary coverage of American dissertations accepted at accredited instituations since 1861. Over ½m. abstracts, and many Canadian and other non-U.S. theses are now included.	Online: Lockheed BRS Offline: NLA	$55 + 12¢ per ref. $37.50 + 15¢ per p. $50 per search
DRUGDOG Included in:	Drug Literature Index EXCERPTA MEDICA			
EPB	Environmental Periodicals Bibliography	Covers the fields of general human ecology, atmospheric studies, energy, land & water resources, nutrition & health. 80,000 references from 250 periodicals from 1973 on.	Online: Lockheed Offline: NLA	$60 + 15¢ per ref. $50 per search
ERIC	(Research in Education (Current Index to Journals in Education	The complete data-base on educational journals and reports from the Educational Resources Information Center. Includes early childhood education, exceptional children, higher education, reading and communication skills etc. Over 300,000 citations from 1966 on.	Online: Lockheed SDC BRS SUNY AUSINET Offline: NLA	$25 + 10¢ per ref. $35 + 8¢ per ref. $25 + 15¢ per p. ? $35 + 5¢ per p. $20; SDI $50

Table 5.6.2 (Continued)

Data-Base	Published equivalent	Scope	Availability	Cost
EXCEPTIONAL CHILD EDUCATION RESOURCES	Exceptional Child Education Abstracts	The Council for Exceptional Children produce this bibliographical data-base covering the education of handicapped and gifted children. 26,000 references to journal articles, books, reports, curriculum materials and films, from 1966 on. About 40% of the records are duplicated in ERIC.	Online: Lockheed BRS Offline: NLA	$25 + 10¢ per ref. $30 + 15¢ per p. $50 per search
EXCERPTA MEDICA	42 Excerpta Medica abstract journals	Contains references and abstracts of the world literature on human medicine and related disciplines, including drug and pharmaceutical literature, environmental health, health economics, etc. 600,000 references from 3,500 journals from 1975 on. (14)	Online: Lockheed Informatics	$55 + 15¢ per ref. $90 + 40¢ per p.
HEEP Included in:	Health Effects of Environmental Pullutants TOXLINE			
INIS	INIS ATOMINDEX	International Nuclear Information System covers all aspects relating to the peaceful use of nuclear science & technology, including nuclear medicine. Includes Nuclear Science Abstracts. Over 80,000 citations per year are added to journals, books, reports, patents, proceedings etc. Covers 1970 on.	Offline: Australian AEC NZ DSIR	SDI - Free? SDI - Free

Table 5.6.2 (Continued)

Data-Base	Published equivalent	Scope	Availability	Cost
IPA Also included in TOXLINE	International Pharmaceutical Abstracts	Covers all phases of the development and use of drugs, including drug metabolism, adverse reactions, and practical, theoretical, legal and economical aspects of drug use. Includes nearly 50,000 references from 1,000 journals from 1970 on.	Online: Lockheed	$50 + 15¢ per ref.
LANGUAGE AND LANGUAGE BEHAVIOR ABSTRACTS	Language and Language Behaviour Abstracts	LLBA provides selective access to the world's literature on the subject. Includes psycholinguistics, hearing & speech (normal and pathological), learning disabilities, mental retardation, psychopathology etc. 25,000 references to 1,000 journals from 1973 on.	Online: Lockheed Offline: NLA	$55 + 15¢ per ref. $50 ? per search
NASA	(Scientific & Technical (Aerospace Reports (International Aerospace (Abstracts	Covers aerospace engineering, and biological, physiological, psychological and environmental effects of space flight; extends well beyond pure aerospace. Up to 1m references to reports, journal articles, books & proceedings, from 1962 on. Some overlap with NTIS.	Offline: NLA	$35 ? per search
NUCLEAR SCIENCE ABSTRACTS Included in: INIS				
NTIS	Government Reports Announcements & Index	U.S. government R & D report abstracts from 240 government agencies (including HEW) covering a broad range of disciplines. Covers applied sciences and sociology. 640,000 citations from 1964 on. (31)	Online: Lockheed SDC BRS AUSINET Offline: NLA DIC	$35 + 10¢ per ref. $45 + 8¢ per ref. $31 + 15¢ per p. $35 + 5¢ per p. $20 per search SDI $120 p.a.

44.

Table 5.6.2 (Continued)

Data-Base	Published equivalent	Scope	Availability	Cost
NUTRITION ABSTRACTS AND REVIEWS Included in: CAB				
PNI	None	Pharmaceutical News Index indexes news items about pharmaceuticals, cosmetics, medical devices and related health fields, from FDC reports, PMA Newsletter, Washington Drug & Device letter, etc. 27,000 citations from 1975 on.	Online: Lockheed SDC BRS Offline: NLA	$65 + 15¢ per ref. $65 + 15¢ per ref. $45 + 15¢ per p. $50; SDI $50 p.a.
POLLUTION ABSTRACTS	Pollution Abstracts	Covers air and water pollution, solid wastes, noise, pesticides, radiation and general environmental quality. 60,000 references from 2,500 sources, including journals, reports, books, proceedings, from 1970 on.	Online: Lockheed SDC BRS Offline: NLA	$65 + 15¢ per ref. $65 + 15¢ per ref. $55 + 15¢ per p. $50; SDI $150 p.a.
POPINFORM	None	A George Washington University data-base covering published literature & unpublished data on contraceptive technology, family planning programs and population. About 50,000 records from 1968 on.	Online: Informatics	$[illegible]0 + 20¢ per p.
PSYCHOLOGICAL ABSTRACTS	Psychological Abstracts	Covers word literature on psychology, and related behavioral science disciplines. Contains 255,000 references from 900 journals plus books and reports, from 1967 on.	Online: Lockheed SDC BRS SUNY Offline: NLA	$50 + 10¢ per ref. $50 + 10¢ per ref. $45 + 15¢ per p. ? $50 per search
REVIEW OF MEDICAL AND VETERINARY MYCOLOGY Included in: CAB				

Table 5.6.2 (Continued)

Data-Base	Published equivalent	Scope	Availability	Cost
RINGDOC	RINGDOC Abstracts Journal	Part of the Derwent Pubs. information system. Pharmaceutical and clinical-medicine-oriented chemical literature from over 400 journals can be accessed by keywords and codes representing chemical fragments. ½m.citations from 1964 on.	Online: SDC Offline: NLA	Only available to RINGDOC subscribers ?
SCISEARCH	Science Citation Index	Multidisciplinary index to the literature of science and technology, including life sciences and clinical medicine Has almost 2 million references from 2,600 major journals from 1974 on. Citation indexing is provided which allows retrieval of newly published articles which refer back to a significant source article.	Online: Lockheed AUSINET Offline: NLA	$70 + 10¢ per ref. $35 + 5¢ per p. $20; SDI $75 p.a.
SOCIAL SCISEARCH	Social Science Citation Index	Multidisciplinary coverage of social and behavioral sciences. Contains 540,000 references from 1,000 journals from 1972 on. Citation indexing is provided. (31)	Online: Lockheed BRS ? AUSINET Offline: NLA	$70 + 10¢ per ref. $35 + 5¢ per p. $20; SDI $50 p.a.
SOCIOLOGICAL ABSTRACTS	Sociological Abstracts	Worldwide coverage of sociology and related disciplines in social and behavioral sciences. 100,000 abstracts from over 1,200 journals, plus books and proceedings, from 1963 on. (31)	Online: Lockheed BRS ? Offline: NLA	$55 + 15¢ per ref. $50 ? per search
SSIE	None	Smithsonian Science Information Exchange - Current Research contains outlines of government and privately funded U.S. research projects either in progress or recently completed, and not yet published. Multidisciplinary, including behavioural, biological, medical and social sciences. Approx. 200,000 projects.	Online: Lockheed SDC Offline: NLA	$90 + 20¢ per ref. $110 + 25¢ per ref. $50; SDI $150 p.a.

CHAPTER 6

ACCESS TO COMPUTER-BASED INFORMATION SERVICES

6.1 PRESENT SITUATION

New Zealand medical libraries already have offline access to many of the data-bases of medical and related interest. Table 5.6 gives the sources of some such services in Australia and New Zealand. Services are available for most of the commercially operated data-bases, but not for NLM's smaller specialised data-bases.

A few data-bases (notably INIS, AGRIS and COMPENDEX) are already operated in New Zealand under batch processing for SDI and, in some cases, retrospective searching. A much wider range of data-bases are batch processed in Australia and are available through NLA and CSIRO. However, in some cases, and especially for retrospective searching, it may be cheaper to pay another library to do an online search, rather than pay the prices charged by the batch processing services. In fact, NLA offers to do online searches on all the Lockheed DIALOG data-bases, though the charges are relatively high because of online telecommunications costs between Australia and the U.S.A. With the introduction of the cheaper MIDAS telecommunications link the charges may fall. The Ernest and Marion Davis library in Auckland Hospital has an informal arrangement with a British medical library for the supply of MEDLINE searches done on BLAISE. This has been found to be quicker and cheaper than NLA MEDLARS searches. Theoretically, such a 'commissioning' arrangement should be cheaper with an American library, which has the advantage of cheap telecommunications access. The University of Hawaii, which offers its users MEDLINE searches for as little as US$4, may be a possible contact point.

However, with all these means of access there is a time delay and the end-user cannot be directly involved in the search process. Only online access can overcome these problems and the other disadvantages of offline or batch processing discussed in Chapter 3.

Online access to overseas services is technically quite feasible. All that is required is a computer or teletype terminal and an accoustic coupler or modem for linking the terminal to a telephone. However, because there are no special international time-sharing data communications links from New Zealand, ordinary telephone lines have to be used. International toll call rates to the USA (California) and Australia (Canberra) are $2.40 and $1.40 per minute, or $144 and $84 per hour respectively. In comparison, the MIDAS charges are about A$10 - 12 per hour plus A$0.50 - 0.60 per 1000 characters. (91) New Zealand users could access America via Australia and MIDAS which would reduce the cost to about $100 per hour. Leased lines would probably not be economical until a high volume of searching was reached.

Most New Zealand libraries would find the U.S. rates too high, especially when data-base charges are added on, though they are comparable with current Australian charges for offline retrospective searches. For example, a ten minute search of BIOSIS or Psychological Abstracts would cost about $25 plus 10 cents per reference printed offline. The rates to Australia are somewhat lower, but Australia

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has only two online services, AUSINET and the NLA-Department of Health MEDLINE network. AUSINET has only a limited range of data-bases of medical interest and as it has minimum charges of A$350 per month, it is unlikely to be used by New Zealand medical libraries. The Australian MEDLINE network is the only online service which would receive much use from New Zealand medical libraries with present telecommunications facilities and charges. This option is discussed in more detail in 6.2.3 below.

Fortunately, telecommunications services are rapidly changing and developing throughout the world. The U.S.A. had its first public time-sharing data communications network, TELENET, in 1976. The EURONET network in Europe started operations in 1978 and the MIDAS link between Australia and the U.S.A. has just become operational in 1979. It should not be long before New Zealand has access to low-cost data communications networks. The New Zealand Post Office is now investigating this possibility, partly as a result of pressure from the CBIS Working Group of the Trustees of the National Library. It is intended to set up an experimental node in New Zealand for access to American networks, within the next few months. The telephone call to the node in New Zealand will be toll free, and the charges for the international link will be similar to MIDAS rates.

Because the CBIS Working Group has been working in the telecommunications area, this study has been limited to the investigation of telecommunications requirements specifically for access to MEDLINE. MEDLINE is available from non-commercial operators (though it is now also available from one commercial operator, BRS) and because of its non-commercial, government subsidized origins, arrangements for access differ from other data-bases. In addition, it is likely to be one of the most heavily used data-bases, so the possibility of operating the data-base in New Zealand must also be considered.

6.2 MEDLINE ACCESS ALTERNATIVES

Three different methods of access to MEDLINE will be considered and costed: operating the data-base in New Zealand; online access to NLM via international telecommunications; online access to the Australian MEDLINE network via international telecommunications.

6.2.1 NEW ZEALAND OPERATION

The letter from the U.S. National Library of Medicine reproduced in Appendix 5, outlines NLM's international 'quid-pro-quo' agreements and describes the two means of access to MEDLINE available. These are mounting the tapes in New Zealand or using international telecommunications to access NLM. This section is concerned with costing the first alternative in which NLM would supply the MEDLARS tapes and associated software, for operation in New Zealand. Some programming would still be required to interface the software with the New Zealand computer.

The cost of operating the MEDLINE data-base online for two hours per day was estimated by the NLA in 1976. (94) Table 6.1 reproduces some of those figures for an operational level of 6050 retrospective searches and 2500 SDI profiles, with fixed costs allocated between the two. The costs to both the NLA and the Australian Department of Health are included, and cover the cost of the analyst who performs the search. Telecommunications between Canberra and remote locations are excluded.

Table 6.1 Estimated MEDLINE operating costs in A$ (NLA, 1976)

		Cost per search at 6050 p.a.	Cost per SDI profile at 2500 p.a.
Variable costs:	Analysts	5.00	1.10
	Clerical	3.10	4.60
	Administration	1.40	1.70
	Overheads	4.20	2.40
	Postage	0.50	9.00
	Stationery	0.70	2.50
	Communications (within Canberra only)	0.20	--
Fixed costs:	Data-base	6.80	1.70
	Programming	5.10	12.40
	Computer time	10.20	19.80
	Hardware	2.90	--
		A$ 40.10	A$ 55.20

Data-base charges (A$47,500 p.a.), programming support costs (A$61,500 p.a.), computer time (2 hours per day, 5 days per week at commercial rates gives A$90,000 p.a.), and hardware (10 disks plus 5 terminals, prorated and amortized gives A$17,545 p.a.) are all treated as fixed costs. Thus the overall cost per search would vary, depending on the number of searches per annum. It was estimated that the two hours per day online time would allow a total of 10,000 searches per annum. Costs per search for various levels of searching are given in Table 6.2, based on these figures, and on the assumption that the ratio of retrospective searches to SDI profiles would remain the same.

Table 6.2 Estimated costs per MEDLINE search at various levels of demand

No. of searches p.a.	Cost/search A$	
1,000	165.00	(or 134 if online time limited to 1 hr/day)
2,000	90.00	(or 75 " " " 1 "
6,050	40.10	
10,000	31.30	

About A$10 of the total variable costs of A$15.10 per search are staff costs of the library performing the search.

No doubt costs would be slightly different in New Zealand now, but they would be of the same order of magnitude and economies of scale would be similar. This is further illustrated by NLM's operating costs of approximately US$3.63 per search (excluding analysts costs) in 1977/78 at a rate of 660,000 online searches per annum. (79)

As well as staff and initial setting-up costs for equipment, the libraries performing the searches would also have to pay telecommunications costs. For a computer based in Wellington these would vary from zero for Wellington users to $40 per hour for Dunedin and Auckland users. For a ten-minute search the average cost would be about NZ$4.70 for ordinary dial-up telephone services. This is only a fraction of the overall costs at the searching rate of 1000-5000 p.a. anticipated in New Zealand in the near future. At 2000 searches per annum the overall cost, excluding the searcher's time, would be about NZ$90 per search.

Some of the costs of operating an online system, in particular computer time and systems support, may be much higher than for operating a batch processing SDI servuce. SDI from batch processed tapes is probably the simplest and cheapest type of CBIS to operate, and some data-bases are already operated in New Zealand in this manner. However, it would not be economical to do this for MEDLARS because of the high cost of the data-base, and also because of the relatively low demand for SDI as compared to retrospective searches in medicine. (SDILINE accounted for only 7% of NLM's total online and offline searches in 1977/78.) Indeed, the relative economics of batch processing for SDI versus online SDI (using a stored search profile) from overseas CBIS need to be carefully considered for any data-base, according to Vickery's evaluation. (136)

6.2.2 ONLINE ACCESS TO AMERICA

The other type of arrangement offered by NLM is direct access to MEDLINE and the other data-bases on the NLM computer via international telecommunications links. In this case there would be no centralized operating costs in New Zealand, only the costs of data-base access telecommunications, and staff and equipment costs in the searching libraries. At a rate of 2000 searches per annum in the second or subsequent year of the service the costs would be:

Data-base access (US$30,000 ÷ 2000) = US$15	= NZ$14.30 per search
Telecommunications (via Australia, MIDAS and TYMNET: $84 per hr. + A$12 per hr. + A$0.60 per 1000 characters)	≙ NZ$18.70 per search
TOTAL	≙ NZ$33.00 per search

Even with the high telecommunications costs this is much cheaper than the equivalent $90 per search for a New Zealand-based service. It would remain cheaper at 10,000 searches per annum, when the data-base cost per search would be reduced to $3. In fact, cheaper telecommunications between New Zealand and the U.S.A. should be introduced within the next year, in which case these cost figures should be reviewed. However, the contribution of the cost of data-base access per search will still be significant.

Online access to the NLM has the advantages of offering a wider range of data-bases and of longer online hours, currently 18 hours per day (roughly 8 p.m. to 2 p.m. depending on the time of the year). However, NLM also places certain restrictions on the availability of its services (see Appendix 5). In particular, New Zealand would have to designate a national biomedical resource centre to provide backup services.

Rather than entering into a direct agreement with NLM, New Zealand users may prefer to use MEDLINE through the BRS service in America, for which the minimum charge is relatively low. (11) BRS offer MEDLINE at US$10 per hour so the cost of an average search would be NZ$1.70 plus the telecommunications costs, or $20.40 altogether. Offline print charges would be extra. BRS also has longer hours of availability than the Australian service and a wide range of data-bases of biomedical interest. However, MEDLINE is their only NLM data-base, and their other data-bases are relatively more expensive (see Table 5.6). Should cheap-rate international data communications be introduced to America earlier than to Australia, then BRS may become the most economical means of access to MEDLINE. If the telecommunications charges are similar to MIDAS rates, then searches could be performed for less than $10 each. However, the situation would probably only be temporary, as a similar, cheaper service to Australia would most likely be introduced soon afterwards.

6.2.3 ONLINE ACCESS TO AUSTRALIA

MEDLINE is jointly operated in Australia by the NLA and the Australian Department of Health. NLA pays for the data-base and the Department of Health offers free use of its computer in Canberra and its telecommunications network. Thus, Australian libraries only have to pay their own staff and equipment costs, plus any telecommunications costs for reaching the nearest network node. (96) MEDLINE is online for three hours per day, 10 a.m. - 12 noon and 2 - 3 p.m. Australian EST.

As a result of negotiations between the two National Librarians, NLA has offered New Zealand libraries access to MEDLINE on the same basis as Australian users. The only costs would be staff and equipment for searching, and telecommunications costs to Sydney, the nearest node of the MEDLINE network. At present the cheapest type of telecommunications would be dial-up services using DATEL lines (telephone lines specially conditioned for carrying data) as the use would not justify a leased line. This is shown by the analysis below.

Dial-up:

Variable costs:	Tolls at $84 per hour	= $14.00 per ten-minute search
Fixed costs:	Port to Australian computer (approx. $1500 amortized over 5 yrs. at 2000 searches p.a.)	= 0.15 per search
	TOTAL	= $14.15 per search

Leased Line:

Part-time rental, 3 hours per day, 5 days per week of a standard voice grade circuit.

New Zealand rental payment	$1950	per month
Australian rental payment	1520	per month
Local link (from exchange to library @ $3.50 per km. per month)	?	
TOTAL	$3,470	plus, per month
	= $41,640 +	per annum

For 2000 ten-minute searches per annum, cost = $20.80 per search.

This is the cost for one individual library leasing its own line. If the other libraries were to share this line, using dial-up access to the New Zealand node, the cost per search would increase by an average of about $4.70 to approximately $25.50 per ten-minute search at 2000 searches per annum.

The cost for leasing a network, i.e. one trans-Tasman line with links to the four main centres in New Zealand, would be as follows:

Leased network:

Part-time rental, 3 hours per day, 5 days per week.

Trans-Tasman line, both ends (as above)	$3470	per month
New Zealand line, Auckland to Dunedin	$ 844	per month
Local links to exchanges (@ $3.50 per km. per month)	?	
TOTAL	$4314 +	per month
	= $51,768 +	per annum
At 2000 ten-minute searches per annum, cost	= $ 25.90	per search.

Obviously direct dialling to Australia is the cheapest alternative for MEDLINE searching at the rate of 2000 searches per annum, which might be expected within three years. A leased line network would not become economical until the rate of searching reached 3700 per annum. It is likely that cheaper telecommunications facilities will be made available long before that level is reached.

The possibility of using the Department of Health computer and telecommunications network for the New Zealand part of the network was briefly examined. Apart from the fact that the Health network is not yet fully operational, it was basically designed as a double-star configuration for accessing the two computers in Auckland and Christchurch, rather than for traffic between the North and South Islands. In addition, security is so tight that hospital libraries would have difficulty in gaining access, let alone university libraries.

The use of AUSINET telecommunications facilities between Australia and New Zealand has also been suggested as a means of accessing MEDLINE in Australia. However, since the New Zealand Post Office ruled against an AUSINET link to New Zealand, this is now impossible.

However, even using dial-up access, use of the Australian MEDLINE service at $14.15 per search would be far cheaper than entering an agreement with NLM for either tapes to run in New Zealand, or online access to NLM. The NLA service has the disadvantages of only being available three hours per day, and of having a limited range of databases. At present only MEDLINE, SDILINE and CATLINE are available online, although BIOSIS will be added during 1979. NLA itself has online access to CANCERLINE, CLINPROT, SERLINE, AVLINE and RTECS at NLM, and offers searches on these data-bases at A$50 per search.

The lower price obviously outweighs the disadvantages, especially since the MEDLINE data-base alone would be expected to account for half of all the medical libraries' online searching. Thus Australia is New Zealand's best option for accessing MEDLINE at present. The situation would change if the NLA decided to introduce charges for MEDLINE, or if telecommunications to the U.S.A. became cheaper.

6.3 CONCLUSIONS

For a rate of 2000 ten-minute MEDLINE searches per annum, which New Zealand might expect in two or three years, the approximate costs per search for various means of access are as follows:

a) $90.00 for operating the data-base in New Zealand;

b) $33.00 for online access to NLM;

c) $20.40 for online access to BRS;

d) $14.15 for dial-up online access to the Australian MEDLINE network.

These costs include computer and communications charges, but exclude the cost of staff and equipment in the searching library.

Thus, the most cost-effective means of access to MEDLINE at present is to use the Australian MEDLINE network, via ordinary dial-up telephone lines. The total cost per search, excluding the searcher's time, but including the fixed equipment costs of $3 - 4 per search, (see Chapter 7) would be about $17 - 18. Depending on who does the work, any search taking longer than two to four hours manually, would be more cost-effective online. Therefore, the conclusions from Chapter 3 about cost-effectiveness would appear to be true for New Zealand, even using existing telecommunications facilities.

When cheaper data-communications are introduced, online searching will be even more cost-effective. It may then become economical to use American data-bases in addition to MEDLINE. BRS may also become more economical than Australia for MEDLINE, but the situation would probably only be temporary, as telecommunications costs to Australia should be cheaper than to America in the long run.

CHAPTER 7

IMPLEMENTATION OF COMPUTER-BASED INFORMATION SERVICES

7.1 INTRODUCTION

To operate a successful computer-based information retrieval service requires more than simply having access to data-bases and telecommunications networks. For the library offering the service, equipment, supplies and staff training are required at the setting-up stage, and on a continuing basis. Staff duties must be reorganised, and the library must be administratively prepared for the impact of online services, with policy, promotion and control methods, and backup services. The library must be ready to allocate the necessary financial and staff resources for those developments associated with CBIS. The requirements are discussed in more detail in the rest of this chapter.

7.2 EQUIPMENT AND RUNNING COSTS

There are certain fixed costs associated with making online CBIS available, quite apart from the variable costs of telecommunications, computer and staff time already discussed. The following summary is based on the NLA MEDLINE application Kit (96) with New Zealand costs substituted where available.

Setting-up costs	$
Computer terminal	2000
Terminal delivery and installation	100
Post Office connection fee (telephone and modem)	100
Training	300
Search manuals	40
	2540

Setting-up costs amortized over 5 years = $508 p.a.

Annual running costs	$
Rental of individual telephone connection	326
Modem rental	186
Training	300
Search manuals	80
Paper for terminal	100
Terminal maintenance agreement	250
	1242

Total fixed costs = 1750 p.a.

Significant variations in costs would occur if the library has more than one application for the same terminal, or if a more sophisticated terminal is chosen. Rental of the modem may not be essential as some terminals have either a modem or an accoustic coupler (which performs a similar function) built in. Training costs obviously depend on the method chosen, in particular, whether training is in New Zealand or Australia. The Australian figures are used here as an estimate.

For a rate of 500 searches per annum (equivalent to 2000 per annum from four centres) the library's fixed costs would amount to $3 - 4 per search.

7.3 EQUIPMENT SELECTION

Terminal selection is discussed in papers by Radwin (114) and Bonn (15) and a list of suitable terminals is included in the NLA MEDLINE application Kit (96). The main points to be considered are whether to have a printing or display terminal; the required speed in characters per second; whether a portable terminal is required; and whether to lease or purchase the terminal. A printed record of the searches is considered essential, so if a video display unit is used a 'slave' printer would be required as well.

There has been little published in library literature about the relative merits of modems and accoustic couplers. (See the Glossary for explanations of these terms.) Essentially they both do the same job of linking the terminal to the telephone, but the modem is 'wired in' whereas the accoustic coupler transmits a sound signal from the terminal to the telephone receiver. Accoustic couplers can be purchased separately, or built in to the terminal, and are cheaper than modems, which have to be rented from the Post Office. In addition, a separate business telephone connection is mandatory when using a modem for international DATEL calls. However, the modem gives a much better quality signal, which is less susceptible to interference. It is possible that the use of modems will be mandatory for access to the data communications network node the N.Z. Post Office is planning.

Space for the terminal must also be allowed for, though small portable terminals can easily be packed away when not in use. It is generally considered preferable to have the terminal located somewhere in or near the Reader Services deparrment, and in a position where it is publicly visible, but not audible, for example in a glassed-off area.

7.4 STAFFING FOR CBIS

7.4.1 THE USER/INTERMEDIARY CONTROVERSY

Before discussing actual staff requirements, it is probably necessary to deal with the viewpoint that library staff should not perform the searches; rather, the end-users should do their own searches.

When online services were first introduced, a lot of effort went into the design of the interface between the user and the computer system, with the aim of making the interface suitable for the end-users, who would be relative novices at online searching. However, it transpired that most users did not want to do their own searches. (33, 41) Few users would need online searches often enough to become familiar with the software and data-base vocabulary. Hence, their searching tends to be inefficient, and does not make full use of the system's capabilities. Typing ability and booking the terminal can also be problems for users doing their own searches. Williams (149) compared search times for users and an intermediary (library staff member) doing the same search, and found the average times were 44 minutes and 19 minutes respectively. The intermediary also obtained higher recall and 90% of the users preferred the intermediary's results to their own. A combination of the user and intermediary working together was considered to be the best arrangement, and gave an average search time of 30 minutes.

The lower recall for user searches and the longer times for user, or user plus intermediary searches have been confirmed elsewhere. (8, 71, 52)

However, the intermediary can be a barrier to communication between the user and the system. Ruhl reports that 37% of search revisions were required because the users had redifined their requests on seeing the results. (115) Had the user been present during the search, a rerun would not have been necessary. Thus, the presence of the user can lead to better search results, but at the expense of a longer search.

Intermediaries do the searching in most libraries now, though the user is often encouraged to be present, and frequent users may do their own searches. The emphasis is on flexibility and cooperation with the user.

7.4.2 STAFF REQUIREMENTS

Before embarking on CBIS the library needs to know the overall requirements for staff time. This can be significant, but most small libraries manage with existing staff, rather than having to employ extra personnel to operate the online services.

The average time spent actually online varies from 8 to 15 minutes, depending on the searcher's experience. Australian users currently report a 15 minute average, but NLM's average in 1977 was about 8 minutes. Additionally, the searcher will spend two to three times as long offline in the pre-search interview and preparation and the post-search follow-up. Sommerville gives a detailed account of all the steps in the interview, which she says may last 20 - 40 minutes.(119) The overall time required for a search will be about 40 - 60 minutes. (27, 139)

Staff time would also be used in training and continuing education, promotion, user education, and service evaluation. According to Vickery, one intermediary can manage about 1200 searches per annum. (136) Thus when New Zealand reaches 2000 MEDLINE searches per annum, each centre would need to assign a quarter to a half a person to online services. No doubt some time would be saved in ordinary reference work, but much of the time saved would be users' time rather than library staff time, because the number of requests handled would increase substantially with the introduction of online services.

In small libraries the choice of the person, or persons, to operate the online service will very much depend on the skills of the available staff. The service should preferably be integrated with ordinary reference work, so that manual and computerized searches complement, rather than compete with, each other. Although online services may result in an increased workload, they usually give increased job satisfaction to those involved. (5)

7.4.3 STAFF TRAINING

In order to perform effectively the searcher must have a thorough understanding of the search programs (the 'software') and their capabilities. Equally important is a knowledge of the content of the various databases, their vocabulary structure, and their indexing policies and procedures. Thus separate training for each data-base and each online system in use may be necessary.

The most important part of the training is the actual practical experience at the terminal, and there is plenty of evidence that formal training is not essential to become a proficient searcher. (52, 139) NLM and Lockheed both provide online computer-aided-learning programs which give the searcher instruction and practice in the use of the system. Use of these programs, together with study of the search manuals could give an adequate introduction to online searching.

However, the NLA currently require their MEDLINE users to undertake a standard three-week training course, which includes both instruction and 'hands-on' experience. The structure of the course may soon change to come more into line with NLM's multi-level, modular training programme. (96, 64) This involves short, one-week training courses combined with on-the-job training.

For training New Zealand searchers, the one long course would be more suitable at this stage, because less travel would be required. It has been suggested that New Zealand could pay for an NLA analyst to visit this country and conduct such a course, and NLA has agreed in principle. NLA has also advised that New Zealand should first send a trainee to Canberra for 6 - 8 weeks, for practical 'hands-on' experience, without high telecommunications costs. This person could then assist in leading the training course and could act as 'network controller' in New Zealand. The person could also offer an advisory service equivalent to the NLM 'Service Desk' or the BLAISE 'Help Desk'. However, such an arrangement would very much depend on the availability of a suitable person to visit Australia.

Staff time must also be allowed for continuing education activities, such as attending workshops, and studying the updating newsletters published by NLA and NLM ("Australian MEDLINER" and "NLM Technical Bulletin").

Apart from training the searchers, it is important that the whole library staff receive some education in the role and capabilities of CBIS. All the reference staff must be able to decide when a query would be best dealt with by computerized search. Similarly, staff involved with verification for interloans, ordering, or cataloguing should understand how online searching can help them.

7.5 POLICY, PRICES AND PROMOTION

The question of charges relates very closely to promotion and control of CBIS, because charges can be used as a means of promotion or control.

The debate about whether to charge at all is still continuing. It is difficult to justify offering a free manual reference service, while charging for computerized services. However, the present concensus of opinion seems to be that charges are undesirable, but may be necessary if any service is to be offered at all. A survey of U.S. academic libraries offering online services in 1975, showed that 58% charged some or all of the costs to the users, and only 38% of the libraries paid for or subsidised the searches. (87)

In most countries which have MEDLINE services, the service was initially introduced on a free, or at least subsidised, trial basis, and in effect the U.S. government still subsidises the service. The free introductory period is a method of promoting the service to potential users who are largely unaware of the capabilities of CBIS. At this time there are very few people in New Zealand who have first-hand experience of the benefits of online services, so it would be difficult for any service introduced on a cost-recovery basis to get off the ground. In view of the long-term benefits expected from CBIS, it would be worthwhile putting government or research funds into a free or subsidised MEDLINE service for an experimental period. The publicity from this experiment would filter through to other subject fields and help in the general promotion of CBIS in New Zealand.

Such a promotional experiment could offer searches entirely free, or for a nominal charge. There is some value in having what Atherton (5) calls a 'nuisance charge' to discourage wasteful use and to help control the demand to a level staff can cope with. Overseas studies and the results of the University of Otago user survey both indicate that students would make a heavy demand on the service if it were free. While, in principle, medical libraries should encourage students to use such services, in practice, the library staff might not be able to cope with the large number of users.

The amount charged depends on whether the aim is simply to control demand, or to recover some of the costs. In fact, Summit claims that, so long as there is a charge at all, the actual amount charged makes little difference to the level of demand. (123) NLM's experience also indicates that small price increases do not affect demand, (see Chapter 4).

If the goal is full cost-recovery, then the library may have to institute elaborate accounting procedures, to keep a record of all the costs involved. More commonly, libraries just charge to cover the out-of-pocket costs for telecommunications, data-base charges and offline printouts. With a subsidised service the simplest method is to have a fixed charge per search. Alternatives are to have a flat rate subsidy per search, or a combination of 'standard' and 'special' searches, with standard searches at a fixed charge and special searches charged on the basis of the actual cost.

If the library is subsidising the service, then it is important to decide who will be allowed to use it. Some libraries allow outside clients to use their CBIS, but only on a full cost-recovery basis, including the cost of the staff time involved.

If an experimental MEDLINE network is set up in New Zealand, there could be considerable demand for MEDLINE and other data-bases from outside of the medical libraries' normal clientele. It would, therefore, be important to have a uniform policy among the centres as to who could use the services and what prices, if any, should be charged.

Prices are obviously not the only means of promotion and control of demand for CBIS. A well planned publicity campaign is essential. Some of the more commonly used methods - circulars, posters, lectures and demonstrations - are evaluated for their effectiveness by Holmes (55) and Vickery (136). It has frequently been reported that word-of-mouth is the most effective means of promotion of online services. Unfortunately, it is also the most difficult method to control, and can cause a sudden and unexpected escalation in demand.

The library setting up a computer-based information service must also establish procedures for continuous evaluation of the service. This is necessary both for improving performance, and for convincing the authorities that continued funding is worthwhile.

7.6 BACKUP SERVICES

CBIS should not be considered in isolation because they will have a considerable impact on other library activities. Various libraries have reported: an increased number of users (56); increased circulation and photocopying (115); and an increase in interlibrary loans. The greatest impact is usually on interlibrary loans, with some small libraries reporting increases of 67% to 168% in the number of articles requested. (49, 90) However, the effect on interloan requests in larger libraries may be insignificant, especially if other local collections are available to the users. (50) If outgoing interloan requests increase in one library, then other libraries will have to supply an increased number of incoming requests.

In New Zealand the four main centres have medium-sized medical libraries, but there is still a considerable amount of interloan traffic between them. Canterbury Medical Library has found that 29% of articles cited in MEDLARS search printouts over the last few years, could not be supplied from stock. However, the survey of the University of Otago medical libraries showed that MEDLARS searches had had very little impact on overseas interloan requests. Either most of the articles can be supplied from within New Zealand, or the users do not bother to request items from overseas. The latter reason may be closer to the truth, since 13% of the sample in the library users survey reported having problems with non-availability of literature in New Zealand.

The demand for MEDLINE is expected to be much higher than MEDLARS requests. Therefore, there could be a considerable increase in interloan traffic, both within New Zealand and overseas. The medical libraries will need to cooperate on a more formal basis to improve the interloan system. Some techniques which are worth examining are an improved, more up-to-date Union List of Serials, and the use of telex to transmit requests. The ultimate in backup services is an online document request system, such as will be introduced in Britain on BLAISE, with the requests being transmitted to the British Lending Library. However, that is a long way off in New Zealand.

Similarly, the medical libraries, with the cooperation of the National Library, should coordinate their acquisitions on a more formal basis, so as to reduce the dependence on overseas interloans. The National Library should survey interloan requests for medical journals not held in New Zealand, as it has already done for journals in other subject fields. The medical libraries and the National Library can then work together to fill the gaps. Decisions will have to be made about how medical literature resources should develop on a national level, for example, on a centralised or decentralised basis. Cooperation on the acquisition of air-mail subscriptions may also be possible. Such coordination would obviously require regular meetings of the medical librarians.

Just as backup literature resources should be developed through cooperation at the national level, so should backup advisory and training services for CBIS. A national centre for promotion and coordination of CBIS could be established to provide training, advice on searching and equipment, and to perform online searches for libraries which do not have their own terminals. This centre could serve libraries in all fields, not just medical libraries.

CHAPTER 8

RECOMMENDATIONS

8.1 EXPERIMENTAL NETWORK

8.1.1 On-line access to the Australian MEDLINE network should be made available on a free or subsidised experimental basis for two years. This would give access to MEDLINE, SDILINE, CATLINE, and later in 1979 to BIOSIS.

8.1.2 Terminals for the network should be sited in the four main centres: Auckland, Wellington, Christchurch and Dunedin. At the present moment the most practicable and cost-effective means of telecommunication to Australia is dial-up access. However, cheap-rate, international data communications services may be introduced by the New Zealand Post Office in the near future.

8.1.3 The computer-based information services used, their products, and the means of access to them should be continuously evaluated during the experimental period.

8.2 IMPLEMENTATION OF THE EXPERIMENTAL NETWORK

8.2.1 The National Library should be designated as the authoritative centre to make negotiations with the Australian National Library on behalf of New Zealand medical libraries.

8.2.2 The National Library should form a Working Group to obtain funding for the experimental network and to oversee its implementation. (A recommendation has already been made by the N.Z.L.A. Health Sciences Librarians' Group AGM 1979 to the National Library that a Working Group should be formed to take action on the recommendations of this feasibility study.)

8.2.3 One or more of the following should be approached for financial support for the experimental network:

Medical Research Council
Medical Research Distribution Committee
New Zealand Medical Education Trust
Universities involved
National Library

8.2.4 These funds would be required for the following items, not all of which would necessarily be funded by the same source:

(1) staff training

(2) terminals and associated telecommunications equipment

(3) telecommunications facilities at the Australian end, i.e. a port to the Australian Health Department computer, if necessary

(4) telecommunications costs for searches during the experimental period.

8.2.5 Staff training should ideally be carried out according to the Australian National Library's proposals, i.e. a New Zealand medical librarian should initially be sent to N.L.A. for training and working experience and should then cooperate with N.L.A. staff to run courses in New Zealand. However, if funds or staff availability do not permit this, the training program should make use of existing staff already trained in MEDLINE use to run courses in New Zealand under the direction of N.L.A. staff.

8.2.6 The Working Group should consider means of strengthening the back-up services required by CBIS, for example, by improved coverage of medical literature in New Zealand, by cooperative acquisition of airmail subscriptions, by improved recording of journal holdings, and by speedier interloan service.

8.3 FOLLOW-UP TO EXPERIMENTAL NETWORK

8.3.1 The Working Group should evaluate the experiment, and in the light of subsequent developments in CBIS and in telecommunications, should make recommendations on future access to medical CBIS from New Zealand.

8.3.2 After the experimental period, and until the Working Group's further recommendations are implemented, the online services from Australia should continue. Charges would probably have to be implemented at this point.

8.4 LONG TERM RECOMMENDATIONS

8.4.1 The National Library should continue to negotiate, on behalf of New Zealand medical libraries, with overseas suppliers for CBIS.

8.4.2 A coordinating committee under the auspices of the National Library with representatives from the Medical Libraries and the National Library, should be permanently constituted to oversee medical CBIS in New Zealand. Its responsibilities would include advice to the National Librarian, administration of the service, organization of training programmes, policy coordination including recommending charging policy if necessary, and cooperation on provision of back-up services.

8.4.3 The National Library should make every effort to obtain cheap telecommunications access to America and Australia, for example through TELENET, TYMNET and AUSINET. Cheap access would widen considerably the range of data-bases available at a reasonable price. It might eventually necessitate a reconsideration of the recommendation to use Australian rather than American MEDLINE services.

UNIVERSITY OF OTAGO

The Canterbury Medical Library

CHRISTCHURCH CLINICAL SCHOOL
CHRISTCHURCH HOSPITAL
CHRISTCHURCH, N.Z.

TELEPHONE [redacted] EXT. 519,
792-900

QUESTIONNAIRE ON INFORMATION SOURCES AND SEARCH METHODS

20th October, 1978

Dear Medical Library User,

Canterbury Medical Library has been given a grant by the National Library of New Zealand to study and report on the potential use of computer-based information services by the users of the three medical libraries of the University of Otago, and to recommend the best means of access to such services. We need your assistance in this study, and would be grateful if you would fill in the enclosed questionnaire on your present and potential information gathering methods. To assist you in answering the questions meaningfully we request that you read the description of computer-based information services given below.

The completed questionnaire should be returned to your Medical Library by Friday, 10 November, 1978.

1. COMPUTER-BASED INFORMATION SERVICES

1.1 Computer-based information services provide automated searches of data-bases for any subjects specified by users' search statements. Most of the currently available data-bases contain bibliographical information (i.e. references with author, subject and sometimes other types of indexes), which is usually similar to that contained in corresponding printed abstracting and indexing journals. For example, the MEDLARS data-base contains the references in Index Medicus, Index to Dental Literature and International Nursing Index, but has abstracts as well and is indexed in more detail than the print versions. Each reference has an average of three subject headings in Index Medicus, and 12 in MEDLARS.

1.2 Increasingly, data-bases are now including actual information, for example, the U.S. National Library of Medicine data-base, CHEMLINE, is a chemical dictionary file, which includes molecular formulae and preferred chemical nomenclature. CHEMLINE is not available in any printed form.

1.3 The data-bases are updated regularly and searches may cover the whole data-base (a "retrospective search") or the most recent additions may be searched each month (a "current awareness search"). Those references relevant to the subject requested are printed out for the requester.

1.4 An outline of some data-bases of medical and biomedical significance is given in section 4 below.

2. ADVANTAGES OF COMPUTERIZED SEARCHING

Some of the advantages of computerized searches over manual searches of equivalent printed indexes (where these are available) are:

2.1 They take less user time and effort.

2.2 A printed bibliography is produced.

2.3 More complex searches combining any number of search terms, in any logical combination desired, are possible.

2.4 More exhaustive searches are generally possible because of more detailed indexing of the computer-based version, and the availability of extra elements (e.g. title and abstract words, publication date) for searching.

3. ACCESS TO COMPUTER-BASED INFORMATION SERVICES

There are two basic modes of access to computerized data-bases: "off-line" and "on-line".

3.1 OFF-LINE SEARCHES

3.1.1 Off-line search requests have to be sent to the computer centre operating the data-base. The search strategy is usually formulated by staff there and the searches are processed in batches, and the results posted back to the requester.

3.1.2 This type of search is now available to New Zealand users for MEDLARS from the Australian National Library and for many other data-bases from operators in Australia, Britain and the U.S.A. Because of the distances and delays due to batching searches, the results take from a few weeks to a few months to arrive. The time delay means that off-line searches are only useful for long term research projects.

3.1.3 Charges for off-line searches are usually at a flat rate often with a surcharge if a particularly large number of references is printed. For example, Australian MEDLARS charges are A$20 per search of the 1975-78 files.

3.2 ON-LINE SEARCHES

3.2.1 In on-line searches the user (the requester or a trained search specialist) has direct access to the data-base via national and international telecommunications links. The search is entered through a teletypewriter or visual display terminal and an immediate response from the computer is received at the terminal. This enables the user to interact with the computer and data-base to modify and improve the search strategy on the basis of the feedback of preliminary search results. Once satisfied with the strategy, the results can be printed out immediately at the terminal. If a large number of references is retrieved, a sample can be printed on-line at the terminal and the rest printed on a high speed printer at the computer centre and posted to the requester.

3.2.2 Most data-base operators offer a range of data-bases, so that if the searcher finds the coverage of one inadequate, he can easily swap to another. For example the Lockheed Company based in America offers 94 data-bases, mostly in science, technology and social sciences.

3.2.3 On-line charges are usually based on the time the search takes and the number of references retrieved. In Britain access to MEDLINE (MEDLARS on-line) costs £25 per hour plus 5p per page of off-line printout. In America MEDLINE costs US$10 per hour for computer and data-base, plus US$5-8 per hour for telecommunications. An on-line service is not yet available in New Zealand: although it is technically quite feasible, telecommunications costs are prohibitive. However, it is likely that telecommunications facilities will be introduced in the near future, which will make on-line services available in New Zealand at similar rates to those operating in America and Britain.

3.2.4 An average search takes 10-15 minutes, although a short, specific search which retrieves few references may take less than 5 minutes. Because the charge is related to the length of the search, it may be economically feasible to do short online searches where only a few relevant references are expected or required, but are needed quickly. Thus patient care information requirements can be satisfied, as well as the need for more comprehensive searches typical of research work.

4. DATA-BASES OF MEDICAL AND BIOMEDICAL SIGNIFICANCE

4.1 Available from the U.S. National Library of Medicine.

Data-base	Published equivalent	Scope
MEDLARS/ MEDLINE	(Index Medicus (Index to Dental Literature (International Nursing Index	Covers clinical, preclinical and experimental medicine and related biomedical subjects. 2.5 million references from 3000 biomedical journals from 1966 on.
TOXLINE	None	Covers toxicology, analytical methodology, adverse drug reactions, environmental pollutants and hazardous products 800,000 references selected from 10 different sources including Medlars, Biological Abstracts, Chemical Abstracts, International Pharmaceutical Abstracts, etc.
CHEMLINE	None	A chemical dictionary file containing records for all chemical substances cited in TOXLINE. 250,000 records each contain preferred chemical name, synonyms, molecular formula and structure information and CAS registry number.
CANCERLINE	(Cancer Therapy Abstracts (Carcinogenesis Abstracts (ICRDB(unpublished)	Based on the National Cancer Institute's International Cancer Research Data Bank. 90,000 references from 1967 on.

Data-base	Published equivalent	Scope
CANCERPROJ	None	Descriptions of 10,000 on-going cancer research projects and clinical trials.
EPILEPSYLINE	Epilepsy Abstracts	Covers investigative and clinical aspects of epilepsy and basic neurosciences. Approx. 25,000 references from 3,500 journals from 1945 on.
BIOETHICSLINE	Bibliography of Bioethics	Comprehensive cross-diciplinary collection of references to print and non-print materials on bioethical topics, including human experimentation, abortion etc. Includes 7,000 references, from 1973 on, to journal and newspaper articles, legal information, etc.
AVLINE	NLM AVLINE Catalog	Information on approximately 3,000 audiovisual instructional materials in health sciences, from 1975 on.
RTECS	Registry of Toxic Effects of Chemical Substances	Contains toxicity data for approximately 21,000 substances, including toxic effects, thresholds, standards etc. Indexed from 60,000 synonyms, and also by animal species, route of administration, and many other access points.

4.2 Available from other, commerical data-base operators.

Data-base	Published equivalent	Scope
BIOSIS	(Biological Abstracts (Bioresearch Index	Covers all aspects of biosciences and medical research from 1969 on. Contains 2.5 million references from 8,000 journals, plus reports, symposia, etc. This is the major English language service providing worldwide coverage of research in the life sciences.
CA CONDENSATES	Chemical Abstracts	Indexes the world literature of chemistry, including biochemistry; organic, macromolecular, physical and analytical chemistry, and chemical engineering. Almost 3 million references to journals, reports, patents, symposia etc. from 1970 on.
EXCERPTA MEDICA	42 Excerpta Medica abstract journals	Contains references and abstracts of the world literature on human medicine and related disciplines, including drug and pharmaceutical literature, environmental health, health economics, etc. 600,000 references from 3,500 journals from 1975 on.

Data-base	Published equivalent	Scope
IPA	International Pharmaceutical Abstracts	Covers all phases of the development and use of drugs, including drug metabolism, adverse reactions, and practical, theoretical, legal and economical aspects of drug use. Includes nearly 50,000 references from 1,000 journals from 1970 on.
PSYCHOLOGICAL ABSTRACTS	Psychological Abstracts	Covers word literature on psychology and related behavioral science disciplines. Contains 255,000 references from 900 journals, plus books and reports, from 1967 on.
SCISEARCH	Science Citation Index	Multidisciplinary index to the literature of science and technology, including life sciences and clinical medicine. Has almost 2 million references from 2,600 major journals from 1974 on. Citation indexing is provided which allows retrieval of newly published articles which refer back to a significant source article.
SOCIAL SCISEARCH	Social Science Citation Index	Multidisciplinary coverage of social and behavioral sciences. Contains 540,000 references from 1,000 journals from 1972 on. Citation indexing is provided.

QUESTIONNAIRE ON INFORMATION SOURCES AND SEARCH METHODS

CANTERBURY MEDICAL LIBRARY
FOR THE UNIVERSITY OF OTAGO MEDICAL LIBRARIES
NOVEMBER 1978

Offic use only

OBJECTIVE:

To establish potential use of computerised bibliographical data bases.

1. PERSONAL DETAILS

1.1 Name (The results of this questionnaire will remain anonymous.) 1-4

Dr/Mr/Mrs/Miss/Ms: ______________________________

1.2 Employing institution - please circle your type of employer.

1. HOSPITAL 2. UNIVERSITY 3. PRIVATE PRACTICE 4. STUDENT 5

5. OTHER - Please specify ______________________________

1.3 Please circle the professional field you are involved in:

1. MEDICINE 2. BIOMEDICINE* 3. PSYCHIATRY 4. PSYCHOLOGY 6

5. PARAMEDICINE (please state which branch) ____________________

6. OTHER (please specify) ______________________________

*Biomedicine: non-medically qualified scientists working in human biology, biochemistry or medicine would be considered here to be in the field of biomedicine.

1.4 Please indicate what percentage of your working time you spend on each of the following activities:

	% of time	
a) Teaching		8-10
b) Research		11-13
c) Student		14-16
d) Patient care		17-19
e) Technological		20-22
f) Administration		23-24
g) Other - please specify: ____________________ ____________________		25-28
Total should be -	100%	

Office use only

2. PRESENT INFORMATION GATHERING HABITS

2.1 When you need information which you would expect to be available in published literature, including books and journals, do you try to obtain the information from the literature. Please circle the appropriate answer.

1. NEVER 2. OCCASIONALLY 3. SOMETIMES 4. USUALLY 5. ALWAYS 30

2.2 If your answer to 2.1 was not ALWAYS, what are the reasons for your not referring to the literature? Tick appropriate boxes.

a) The information is available more quickly or easily from another source. Please specify your other sources. ☐ 31

____

____

b) Lack of time. ☐ 32

c) Lack of the necessary tools (e.g. published indexes, computerised search facilities). ☐ 33

d) The literature containing the information would not be available in New Zealand. ☐ 34

e) Other reasons - please specify: ☐ 35

____

____

2.3 How many times in the last 12 months was published information about any particular subjects searched out for you by each of the following methods? Include those occasions when only a few articles were sought, as well as larger literature searches.

	Total No. of times	
a) By yourself or your staff		37-39
b) By library staff, manually		40-42
c) By computerised search arranged through a library		43-45
d) By computerised search arranged directly by yourself with the data-base operator		46-48
e) By other agent (e.g. Professional Society) - please specify: ____________________ ____________________		49-51
Total		52-54 80(1)

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4. USE OF COMPUTERISED INFORMATION RETRIEVAL SERVICES

4.1 Were you aware of the availability of computerised information services before reading the accompanying letter? 1.YES 2.NO 70

4.2 Have you ever used a computerised information service? 1.YES 2.NO 71

If your answer was no, omit questions 4.2.1 to 4.2.3 and go on to question 5.

4.2.1 Please indicate which data base(s) by ticking the appropriate box(es).

1. MEDLARS/MEDLINE(Index Medicus) ☐ 72
2. BIOSIS PREVIEWS(Biological Abstracts) ☐ 73
3. CA CONDENSATES(Chemical Abstracts) ☐ 74
4. Others - please specify ____________ ☐ 75

____

4.2.2 Were you satisfied with the results in terms of the following features? Please tick the appropriate columns.

	1. Excellent	2. Good	3. Fairly Good	4. Moderate	5. Poor	
a) Relevancy of the references supplied						76
b) Timeliness of the results						77
c) Value for money						78

4.2.3 What percentage of the references were relevant? Please circle the appropriate answer:

1. ABOVE 60% 2. 40-60% 3. BELOW 40% 79

80(2)

5. POTENTIAL USE OF COMPUTERISED INFORMATION RETRIEVAL SERVICES

5.1 How often do you think you might use automated searches of the following data bases for retrospective literature searching, if the cost of a typical search (e.g. yielding 20 references) was each of the various alternatives? Please indicate the number of times per year under each price, against each data base you might use. # 1-4

	Free	$5	$15	$25	$50	
Index Medicus (MEDLARS/MEDLINE)						6-15
Biological Abstracts (BIOSIS Previews)						16-25
Chemical Abstracts (CA Condensates)						26-35
Excerpta Medica						36-45
Psychological Abstracts (PAIS)						46-55
Science Citation Index (SCISEARCH)						56-65
Other data bases*-please specify____________						66-75
						80(3)

* Please refer to the list of data bases with the accompanying letter.

Office use only

2.4 How many times in the last 12 months did you refer to the different abstracting and indexing journals for quick reference, current awareness, and literature searching? (These terms are defined below*) #1-4

	Quick Reference	Current Awareness	Literature Search	
Index Medicus				6-11
Biological Abstracts				12-17
Chemical Abstracts				18-23
Excerpta Medica Sections				24-29
Psychological Abstracts				30-35
International Pharmaceutical Abstracts				36-41
Science Citation Index				42-47
Current Contents				48-53
Other abstracting or indexing journals - please specify				54-59
____________________				
____________________				
____________________				
____________________				

* Quick reference:	Looking for one or two articles to answer a specific question.
Current awareness:	Regular scanning to keep up to date with recent publications on a particular subject.
Literature search:	Looking for enough articles to review a particular subject, often going back over more than one year.

3. CURRENT AWARENESS HABITS

3.1 How do you try to keep up to date with the literature of your subject? Please rate the methods listed below according to their importance to you, on a scale of 1 to 5, where 5 = vitally important and 1 = minimal importance. Do not rate those methods you do not use.

	Rating	
a) Scanning recent journals (including review journals)		61
b) Scanning abstracting or indexing journals		62
c) Current awareness service provided by your library		63
d) Automated current awareness service from a computerised data base		64
e) Discussion and correspondence with colleagues		65
f) Other - please specify:		66
____________________		
____________________		67

3.2 If you use d) in 3.1 above, was this arranged through your library? 1. YES 2. NO. 69

Office use only

5.2 Do you think you would use a computerised current awareness service, giving a monthly list of articles relevant to your specific interests, based on any of the following data bases, at the various costs per annum? Please tick against each data base you might use, the maximum price you would be prepared to pay. #1-4

	1. Free	2. $10 p.a.	3. $25 p.a.	4. $50 p.a.	5. $100 p.a	Office use only
Index Medicus(MEDLARS)						6
Biological abstracts (BIOSIS Previews)						7
Chemical abstracts (CA Condensates)						8
Excerpta Medica						9
Psychological Abstracts(PAIS)						10
Science Citation Index						11
Current Contents (ASCA)						12
Other data bases* - please specify ______________						13
______________						

5.3 If you did use such a service, what funds would you use? Please tick against the most likely source(s) of money.

a) Own money ☐ 15

b) Departmental funds ☐ 16

c) Research funds ☐ 17

d) Other - please specify: ☐ 18

____

6. FURTHER COMMENTS

If you have any further comments you would like to add about the use of computerised information services, please write them here, and continue on separate sheets if necessary.

19=
C=1
D=2
W=3
80(4)

* Please refer to the list of data bases with the accompanying letter.

CLOSING DATE: Please return the completed questionnaire to your Medical Library by November 10th, 1978.

APPENDIX 1B

CANTERBURY MEDICAL LIBRARY
QUESTIONNAIRE ON THE USE OF COMPUTER-BASED INFORMATION SERVICES
FOR THE PERIOD 1/1/71 - 31/7/78

OBJECTIVE:-

To establish the extent to which the following Libraries have been using such information retrieval systems, and to obtain their evaluation of the service provided, with special reference to MEDLARS.

The University of Otago	Medical, Dental and Science Libraries
The University of Otago	Central Library
Wellington Medical Library	Wellington Clinical School of Medicine
Canterbury Medical Library	Christchurch Clinical School of Medicine

PROCEDURE

Please tick or enter answer in boxes provided. Do not leave a question unanswered. If you are in doubt use

NK(not known); or NA (not applicable); or WG (wild guess); or Approx.(approximately).

1. GENERAL DETAILS

1.1 Name of responding Library. ....

1.2 Please state subject coverage. ....

2. MANUAL INFORMATION SERVICES PROVIDED FOR USERS

2.1 Does your Library routinely provide the following?	Yes	No
a) verification of citations		
b) compilation of current bibliographies		
c) compilation of retrospective bibliographies		
d) current awareness (i.e. *SDI) service		

[* Selective dissemination of information]

2.2 Please state any other not included above ....

3. COMPUTER BASED INFORMATION SERVICES [DATA BASES]

	Yes	No
3.1 Have you used any of these?		
3.2 Have you used MEDLARS?		

3.3 How many requests for Literature searches have been made annually for each Data Base?

	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
MEDLARS Data Base									
Other (please specify)									

3.4 How many requests have you instituted per annum for Current Awareness (SDI) services?

	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
MEDLARS Data Base									
Other(please specify)									

3.5 Do you know of any Data Bases that have been used privately by departmental staff (or other Library users)?

Yes	No

3.6 Please list details of such Data Bases.................................

....

....

....

....

4. COMPUTERIZED SEARCHES - PURPOSE

4.1 Please state the approximate % of requests that would be directly related to Patient Care. If yearly % not known, please record as "NK", but try to give an overall approximate total.

	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
MEDLARS Data Base	%	%	%	%	%	%	%	%	%
Other(please specify)									

4.2 Please state the approximate % of requests that would be directly related to Research. If yearly % not known, please record as "NK", but try to give an overall approximate total.

	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
MEDLARS Data Base	%	%	%	%	%	%	%	%	%
Other(please specify)									

5. COMPUTERIZED SEARCHES - EVALUATION

5.1 Recall of citations quoted.

5.1.1 How extensive were these printouts? Would you please supply details of the number of citations for

a) Retrospective search requests

	Lowest	Highest	Average
MEDLARS Data Base print-outs			
Other (please specify)			

b) SDI printouts (Number of citations per month).

	Lowest	Highest	Average
MEDLARS Data Base printouts			
Other (please specify)			

5.1.2 Were there important articles that they knew about that should have been retrieved by the searches but were missed?

	Yes	No
MEDLARS Data Base		
Others (please specify)		

5.1.3 In which fields were these articles? ....
....
....

5.2 Relevancy of citations quoted.

5.2.1 What approximately, was the overall % of relevant articles in the total number of printouts? Please tick the appropriate column and if % is not known please indicate.

a) For retrospective Literature Search requests.

	Over 80%	60-79%	45-59%	30-44%	20-29%	BELOW 20%
MEDLARS Data Base						
Others (please specify)						

b) For SDI.

	Over 80%	60-79%	45-59%	30-44%	20-29%	BELOW 20%
MEDLARS Data Base						
Others (please specify)						

5.2.2 Have your users considered the % of relevant articles to be satisfactory

a) For retrospective Literature search requests?

	Yes	Marginal	No
MEDLARS Data Bases			
Others (please specify)			

b) For SDI?

	Yes	Marginal	No
MEDLARS Data Base			
Others (please specify)			

5.2.3 If the % relevance was not satisfactory what would you attribute this to? Please tick where appropriate.

Lack of a specific indexing term, or terms? ☐
A mis statement by the requester of his/her requirements? ☐
A misinterpretation by the search analyst of the user requirements? ☐
Other (please specify) ....

5.3 Time factor in delivery of citations quoted.

5.3.1 What was the delivery time for the search request printouts? Please state in days. If not known please give an approximation, or record as "NK".

	Shortest Time	Longest Time	Average
MEDLARS Data Base			
Other(please specify)			

5.3.2 Were these delivery times suitable for

	Yes	No
a) Clinicians?		
b) Research personnel?		
c) Other requesters?		

5.4 What factors do you think have prevented bibliographic data bases from being used more? Please rank the following in order of importance.

a) Lack of awareness by users? ☐
b) Anticipation of poor search results? ☐
c) Long delivery time? ☐
d) ~~Cost?~~ Cost ☐
e) Other (please specify)...................... ☐

6. AVAILABILITY OF CITATIONS QUOTED IN PRINTOUTS

6.1 Would you please indicate what % of printout references could not be supplied from your own stock overall?

a) For retrospective Literature Search requests

	Lowest	Highest	Average
MEDLARS Data Base	%	%	%
Other(please specify)			

b) SDI

	Lowest	Highest	Average
MEDLARS Data Base	%	%	%
Other(please specify)			

6.2 What was the approximate number of Interloan requests generated by computerized searches? If not known please indicate by "NK".

a) For retrospective Literature Search requests

	Within N.Z.	Overseas
MEDLARS Data Base		
Other(please specify)		

b) SDI

	Within N.Z.	Overseas
MEDLARS Data Base		
Other(please specify)		

7. SUBJECT FIELDS AND USER CATEGORIES REPRESENTED

Please tick where appropriate:

7.1 Subject fields.

Biochemistry
Dentistry
Medicine
Microbiology
Neurology
Obstetrics & Gynaecology
Paediatrics
Paramedical Fields
Pathology
Psychiatry
Psychology
Religion
Surgery
Other (please specify)

7.2 User categories - What proportion of search requests were related to each of the following categories of work?

	%
Research	
Teaching	
Patient care (clinical)	
Other professional practice	
Administrative	
Technological	
Other	

8. FINANCE

8.1 How have you financed your Data Base search requests? Please tick appropriate box.

- Library funds ☐
- University Department funds ☐
- Hospital Department funds ☐
- Research funds ☐
- Personal funds ☐

9. FURTHER COMMENTS

The closing date for the return of this questionnaire is 31st August, 1978. Please send the completed questionnaire to:-

The Librarian-in-Charge
Canterbury Medical Library
Christchurch Clinical School of Medicine
Christchurch Hospital
Christchurch 1

APPENDIX 2

ANALYSIS OF THE USER POPULATION AND SAMPLE SURVEYED

Table 1 Analysis of users of the three medical libraries

	CM	DU : M	WM	Total
Medical staff	415	824	[700]	[2,946]
Paramedical staff	407			
Med. students 1-3 yrs.	-	(401)	-	(401)
Med. students 4-6 yrs.	255	172	170	597
Other University students	-	(516)	-	(516)
Paramedical students	(147)	(604)	(30)	(781)
Others	213	240	?	453
Total	1,437	2,757	900	5,094
Total potential users	1,290	1,236	870	3,396*

N.B. [ ] indicate approximate figures.

( ) indicate user categories excluded from the sample, i.e. not regarded as potential users.

* 9% of the registration records in the sample were found to be redundant, therefore estimated correct total potential user population = 3,090.

Sample response is 4.24% of the estimated population.

APPENDIX 2

Table 2. Analysis of population, sample and replies by location and user categories

	Population	Sample	Replies	No response	"Dead"
Christchurch					
Medical	415	52	21	24	5
Paramedical	407	50	19	23	7
Students	255	28	9	16	3
Others	213	4	3	1	-
Totals	1,290	134	52	64	15
Dunedin					
Medical	824	65	11	44	8
Paramedical		58	21	29	6
Students	172	14	4	10	-
Others	240	17	8	9	-
Totals	1,236	154	44	92	14
Wellington					
Medical	[700]	30	16	11	3
Paramedical		29	7	20	2
Students	170	25	5	20	-
Others	?	2	-	2	-
Totals	870	86	28	53	5
Overall					
Medical	2,346	147	48	79	16
Paramedical		137	47	72	15
Students	597	67	18	46	3
Others	453	23	11	12	-
Totals	3,396	374	124*	209	34

Note: * 131 replies were received but 7 were anonymous and could not be categorised.

APPENDIX 3

RESULTS OF QUESTIONNAIRE ON INFORMATION SOURCES AND SEARCH METHODS

See Appendix 1 for the precise questions.

1. SAMPLE CHARACTERISTICS

1.1 Location of respondents

Christchurch	55
Dunedin	48
Wellington	28
Total	131

1.2 Employers of respondents

	No.	%
Hospital	58	44
University	40	30
Private Practice	8	6
Students	22	17
Other	3	2

1.3 Professional fields of respondents (Some indicated more than one field)

Medicine	47%
Biomedicine	17.5%
Psychiatry/psychology	7.5%
Paramedicine	15%
Other	13%

1.4 Working activities of respondents (% of respondents involved in each activity)

Teaching	60%
Research	56%
Patient care	49%
Administration	46%
Studentship	32%
Technological	19%
Other	6%

Note: Most respondents were involved in more than one activity, and many were in the 1-40% range of a number of activities. Studentship and patient care were the only activities which tended to occupy most of the time of those involved.

2. PRESENT INFORMATION GATHERING HABITS

2.1 % of respondents who resort to literature for information needs

Never	-
Occasionally	3%
Sometimes	7%
Usually	48%
Always	42%

2.2 Reasons for not using literature for information needs

Lack of time	33%
Better alternative source	27%
Lack of tools (indexes etc.)	13%
Literature not available in N.Z.	13%
Other reasons	4%

2.2.1 Analysis of those giving lack of time as a reason, by work activities

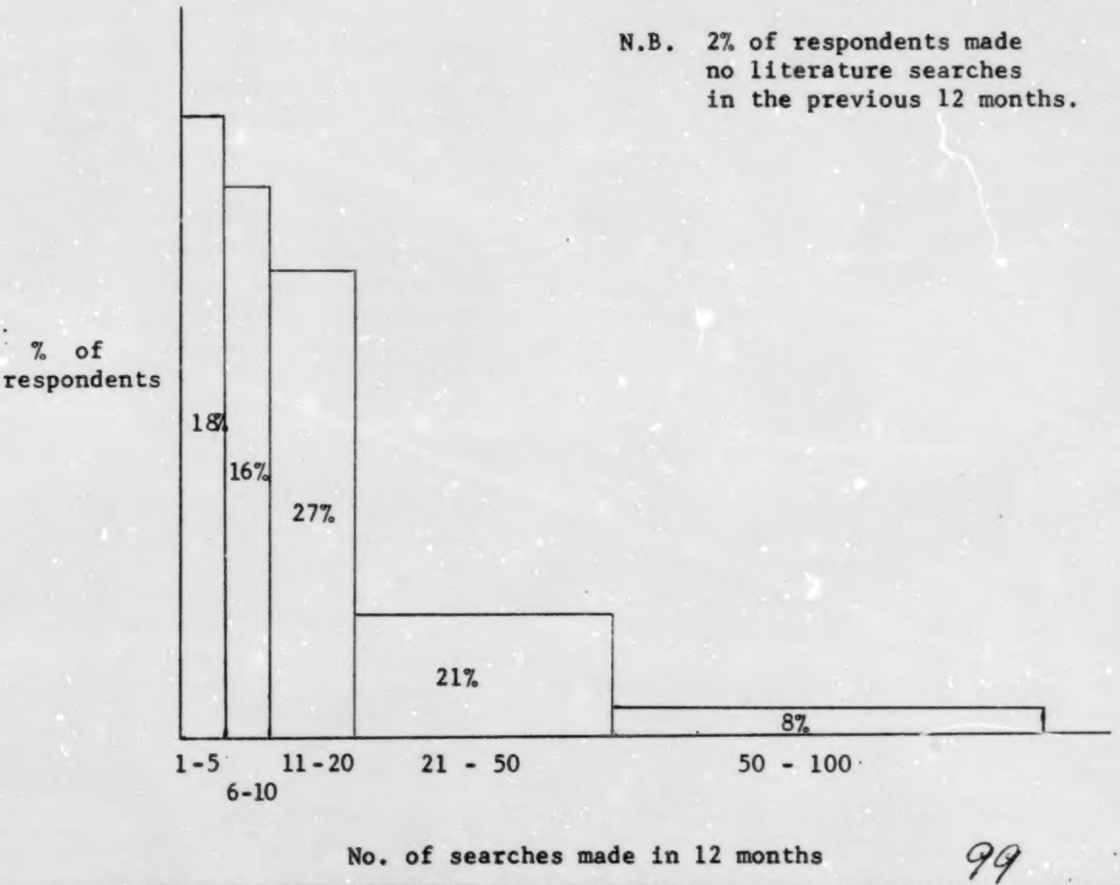
More than 40% of time spent on:	% who found time a problem
Teaching	8.3%
Research	22%
Studentship	36%
Patient care	38%

Note: The difference between the groups is not statistically significant.

2.3 % of Respondents making "literature searches" in previous 12 months

By self	96%
By library	34%
By CBIS	7%
By other agent	4%
By any of above	98%

2.3.1 Frequency distribution of literature searches by any method



N.B. 2% of respondents made no literature searches in the previous 12 months.

2.4 Use of Abstracting and Indexing journals

	Percentage of respondents using for:		
	Quick reference	Literature search	Current awareness
Index Medicus	40	53	10
Biological Abstracts	5	5	5
Current Contents	11	6	18
Science Citation Index	11	9	4
Psychological Abstracts	6	11	5
Excerpta Medica	3	4	3
Chemical Abstracts	5	4	2
International Pharmaceutical Abs.	2	1	1
Other	5	5	4
Total using any A & I journal	56%	66%	32%

Notes: The frequency distribution in each case follows the same pattern as the overall distribution given in 2.3.1 above. Eight titles were mentioned under 'other' - none more than once.

3. CURRENT AWARENESS METHODS

3.1 Ratings of current awareness methods (1 = minimal importance, 5 = vitally important)

	Percentage of respondents giving rating:					Total % using
	1	2	3	4	5	
Journal scanning	6	6	14	14	55	95%
Colleagues	5	10	18	17	28	78%
A & I journals	16	10	10	7	20	63%
Library CA service	14	2	5	2	2	25%
CBIS SDI	1		1	1	2	4%
Other methods	2	3	2	2		9%

Note: The most frequently used methods also tend to have the highest ratings, except that CBIS current awareness services are infrequently used but rated relatively highly.

4. USE OF COMPUTERIZED INFORMATION RETRIEVAL SERVICES

4.1 Prior awareness of availability of CBIS

Yes (aware) = 47%   No = 53%

4.2.1 Previous use of CBIS

	Users	% of respondents
MEDLARS	16	12%
BIOSIS	3	
Psychological Abstracts	2	
5 other data-bases	1 each	
Total users	19	15%

Note: Some users had used more than one data-base.

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4.2.2 Evaluation of CBIS (Number of users giving each answer)

	Excellent	Good	Fairly good	Moderate	Poor
Relevance	7	6	4	2	-
Timeliness	5	7	2	3	2
Value for money	8	6	0	2	2

4.2.3 Relevance of results

Relevance	Users	% of total users
Above 60%	4	21%
40 - 60%	8	42%
Below 40%	7	37%

5. POTENTIAL USE OF CBIS

5.1 RETROSPECTIVE SEARCHES

The main data are reported in Chapter 4, Tables 4.5 to 4.9

5.1.2 Analysis of expected use of CBIS (all data-bases) by professional field and price.

	% in each field which would use CBIS at the given price			
	Medicine	Biomedicine	Psychiatry/ Psychology	Paramedicine
Free	85	79	90	75
$5	77	70	80	40
$25	20	17	30	5

Note: The difference in distribution of use between the paramedical and the medical groups is statistically significant at the 5% level.

5.2 CURRENT AWARENESS SERVICES

See Table 4.11

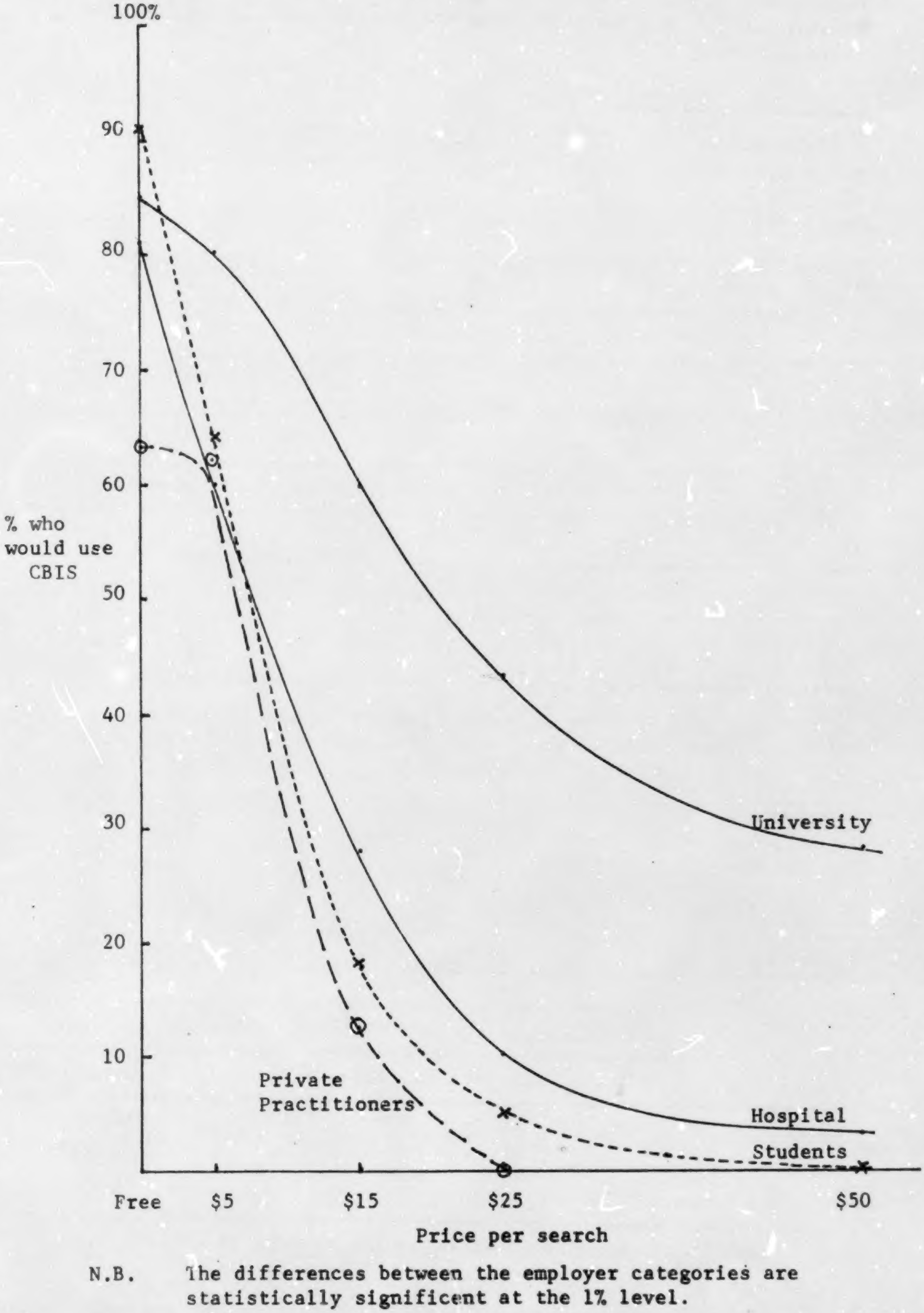
5.3 SOURCE OF FUNDS

Analysis of expected source of funds by employer category

	% of employees who would use the source of funds				
	Hospital	University	Private Practice	Students	All groups
Own money	64	35	75	73	56
Department funds	50	45		14	38
Research funds	3	55		9	21

Note: Many respondents expected to use more than one source of funds.

FIGURE 5.1.1 EFFECT OF PRICE ON EXPECTED USE OF CBIS BY DIFFERENT EMPLOYER GROUPS



N.B. The differences between the employer categories are statistically significent at the 1% level.

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APPENDIX 4

INSTITUTIONAL ORIGIN OF MEDLARS SEARCHES FROM NEW ZEALAND

	Retrospective searches								SDI searches running	
	1971	1972	1973	1974	1975	1976*	1977	1978	At 30.6.76	At 31.3.78
Auckland										
University	13	26	15	18	9		9	1	18	3
Hospitals	2	3	2	11	8		3	-	11	2
Christchurch										
Canterbury Univ.	8	7	2	2	5		-	-	3	1
Hospitals & C.C.S.	1	2	2	5	7	6	3	14	2	1
Dunedin										
University & Hospitals	41	64	25	38	23	12	13	11	23	7
Palmerston North										
Massey Univ.	17	3	-	10	2		1	1	1	1
Hospital	1	-	-	2	1		-	3	4	-
Wellington										
Univ. & Polytech.	-	1	-	-	2		1	1	-	-
Hospitals & W.C.S.	-	1	-	2	9	10	6	2	2	-
Other Hospitals	3	3	4	4	4		5	2	-	-
Government Departments	4	4	11	3	15		4	1	16	6
Private practice, Research Institutes and Industry	-	1	-	1	-		4	1	8	2
TOTALS	90	115	61	96	85	?	49	37	88	23

NOTES: Figures supplied by ANSTEL. Requests were not necessarily channelled through the appropriate institution; some went direct to ANSTEL.

* 1976 figures not available from ANSTEL. Figures only supplied for CM, DU:M and WM.

APPENDIX 5

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

NATIONAL LIBRARY OF MEDICINE

January 25, 1979

Mr. P. H. Cox
Librarian-in-Charge
Canterbury Medical Library
Christ Church Clinic School
Christ Church Hospital
Christ Church, New Zealand

Dear Mr. Cox:

This is in response to your letter of December 22 requesting information about the National Library of Medicine's on-line information services. I am enclosing a copy of our Annual Report and a copy of the publication, "Medical Informatics." I believe this will give you the answers you need for your specific questions concerning costs and the nature of our users. We do not have figures specifically relating to our computer and staff costs for "keeping the MEDLINE data base on-line" because this is all part of a broader systems activity.

With regard to New Zealand's having a direct relationship with NLM, we would have an arrangement identical to that which we have with other countries, including Australia. The National Library of Medicine enters into international MEDLARS arrangements with an institution designated by its country to serve as a national biomedical information resource. The arrangements are quid-pro-quo in nature, in which we provide access to our data base in return for indexing input to the data base. A dollar value is placed on this access of $50,000 for the first year, and $30,000 for each year thereafter. In return for access to the system, the collaborating country indexes its medical literature contained in the MEDLARS data base. Where this indexing is insufficient to meet the quid-pro-quo value, the country funds indexing performed by a United States contractor. This latter procedure would be the case for New Zealand.

There are two modes of access to our system. A country may choose to receive our MEDLARS tapes and mount them on their own computer. This is not a simple matter and sophisticated computer resources and technical personnel are needed. The second mode of access to our computer is through telecommunication linkages. The selection and funding of a telecommunication linkage is the responsibility of the participating country.

CANTERBURY
7 FEB 1979
MEDICAL LIBRARY

In any proposal to us, New Zealand should indicate that

1. New Zealand has identified a national biomedical center to provide services.
2. The proposed mode of cooperation with us.
3. There are adequate resources (personnel, equipment and fiscal) and a large enough user community to develop a stable basis of operations.
4. New Zealand's willingness to send at least two people here at its expense for specialized training in searching the data bases for information retrieval. This training could be for one month or more, depending upon the qualifications of the individual.

I hope this clarifies for you the nature of our arrangements. If there is anything further, please let us know.

Sincerely yours,

Martin M. Cummings, M.D.
Director

Enc.

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